Camas Analysis Area Late-Successional Reserve Environmental Assessment

Myrtlewood Resource Area

Coos Bay District

EA Number OR128-99-23

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Analysis File - available at the Coos Bay District Office

I. PURPOSE AND NEED FOR ACTION

The purpose of conducting density management thinning (DMT) within the Late-Successional Reserves (LSR) is to enhance structural diversity by maintaining or improving tree growth rates and vigor, manipulating species composition, and modifying spatial arrangement. These treatments would enhance structural diversity through density management and begin to restore some late-successional habitat lost through previous management activities. LSRs are intended to establish and/or maintain a network of late-successional forests that provide habitat which supports viable populations of associated species and ensures that native species diversity will be conserved. LSRs are comprised of both young, managed stands that are less than 80 years old and unmanaged old-growth stands. Based on research presented in Tappeiner et al. (1997), the proposed density management treatment units and associated Riparian Reserves are not on a trajectory that is conducive to development of late-successional/old-growth forest habitat. The conditions found are the result of a combination of past management activities (harvest, site preparation burning, planting, precommercial thinning, and fertilization) and probably not within the range of natural variability (Spies & Franklin 1991).

The Bureau of Land Management (BLM) proposes to implement forest density management activities in the Camas Analysis Area. The analysis area is approximately 60 miles southeast of Coos Bay. The analysis area is primarily within the Camas subwatershed which lies within the East Fork Coquille Analytical (fifth field) Watershed. The total analysis area is 9,014 acres in size and lies within LSR #261. BLM manages 54% of the analysis area; the remainder is privately owned. The proposed treatments are located in T28S-R9W and T29S-R9W; Willamette Meridian.

The following goals have been established for LSRs:

Goals:
1. Protect and enhance conditions of late-successional and old-growth forest ecosystems.
2. Create and maintain biological diversity associated with native species and ecosystems.

The proposed action would focus primarily on younger stands (30 to 50 years old) identified for density management treatment by the East Fork Coquille Watershed Analysis. Stands less than 30 years of age have either previously been treated (precommercial thinning), are at such low stand density that treatments are not needed, or are too young for any treatments at this time. The objective of the treatments would be to enhance the development of late-successional conditions while making the residual stands more resilient to disturbance such as wind, fire, and insects. Density management within portions of the Riparian Reserves associated with the proposed treatment areas would also be undertaken at this time in order to establish a trajectory that is likely to attain the desired conditions that meet the Aquatic Conservation Strategy (ACS) objectives.

The proposed action would treat 784 acres of forest stands with density management thinning. This includes treating portions of Riparian Reserves (255 acres) associated with units to be treated. No-treatment buffers would be applied to streams within or adjacent to thinning units as needed to maintain bank/slope stability and shade. Density management thinning would remove a portion of the stands to provide room for the remaining trees to maintain or increase diameter growth. Trees cut but surplus to habitat needs would be removed for commercial use (see Appendix 5). Treatments would be accomplished using ground-based, skyline cable, and helicopter yarding systems. The proposed projects would include renovation/improvement of 2.3 miles of existing roads (all of which would be decommissioned after use) and decommissioning/closing an additional 2.4 miles of existing roads. The proposed projects could be accomplished by timber sale contracts sold in Fiscal Year (FY) 2002 and FY 2003, and/or services contracts, depending on funding.

The South Coast - Northern Klamath Late-Successional Reserve Assessment (LSRA) recommends that at least 10% of the resultant stand would remain untreated when performing density management thinning. No-treatment areas are to provide and retain specified processes and conditions (LSRA, page 82). Areas identified by the IDT to remain unthinned vary in characteristics and therefore contribute differently to the processes and conditions to be retained. Some areas already have a stand composition (species, density, and size) that is desirable. These areas currently exhibit some processes and conditions of late-successional stands and were left unthinned at this time. It may be necessary to consider future treatments in these areas to insure that they remain on this desirable trajectory.

Forest treatments would occur in Late-Successional Reserves as defined in the *Coos Bay District Final Proposed Resource Management Plan*, 1994 and the interagency *FSEIS Record of Decision* (ROD), 1994; respectively. All treatments would be in compliance with the *South Coast - Northern Klamath Late-Successional Reserve Assessment* (LSRA), 1998.

This EA is tiered to the *Final - Coos Bay District Proposed Resource Management Plan*, (FRMP, BLM, 1994), which is in conformance with the *Final Supplemental Environmental Impact Statement on Management of Habitat for the Late Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl* and its Record of Decision (ROD), (Northwest Forest Plan, Interagency, 1994) and the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standard and Guidelines* (Interagency, 2001).

This EA incorporates by reference the *South Coast - Northern Klamath Late-Successional Reserve Assessment* (1998), the *Port-Orford-Cedar Management Guidelines* (BLM 1994)(detailed evaluation is contained in Section L of the Analysis File); the *Western Oregon Program - Management of Competing Vegetation*, (FEIS, BLM 1989); the *Western Oregon Transportation Management Plan* (BLM 1996); and the *East Fork Coquille Watershed Analysis* (BLM 2000). Actions described in this EA are in conformance with the Aquatic Conservation Strategy (ACS) Objectives listed on page B-11 and the Standards and Guidelines for Riparian Reserves on pages C-31 to C-37 of the Northwest Forest Plan. A detailed analysis of the consistency of the action alternatives with the ACS is contained in Section K of the Analysis File. These documents are available for review at the Coos Bay District Office of the BLM, North Bend, Oregon.

The actions proposed in this EA are consistent with Oregon's Coastal Salmon Restoration Initiative (CSRI), the Coquille Watershed Association Action Plan (CWAAP), the U.S. Fish and Wildlife Service's June 12, 2000 Biological Opinion on density management thinning in the Camas Analysis Area Late Successional Reserve (1-15-00-I-352), and the National Marine Fisheries Service's March 18, 1997 Biological Opinion and Conference Opinion on activities covered in the Coos Bay District's FRMP.

The Analysis File contains additional information used by the interdisciplinary team (IDT) to analyze impacts and alternatives and is hereby incorporated by reference.

Scoping

The scoping process identified the agency and public concerns relating to the proposed projects and defined the issues and alternatives that would be examined in detail in the EA. The general public was informed of the planned EA through letters to those on the Resource Area's mailing list, those receiving the Coos Bay *Planning Update*, and through the District's Internet site. The scoping letter, mailing list, and public responses are in Section A of the Analysis File.

Scoping by the IDT identified two major issues that were used to develop and analyze the action alternatives.

Identified Issues

1. Development of Late-Successional Characteristics

   Key Indicators: Growth Rate Acceleration
   Understory Development
   Stand Composition (Heterogeneity, species diversity, & structures)

2. Roads

   Key Indicators: Road Density
   Impacts to Wildlife

Management Objectives (for this EA)

- Conduct density management thinning (DMT) to maintain or improve tree growth rates and vigor, manipulate species composition, and modify spatial arrangement.

- Where necessary, recruit snags and coarse woody debris (CWD).

- Set the stage for understory regeneration, and recruiting snags and CWD.

- Conduct DMT in Riparian Reserves to accelerate growth of trees which would later provide large-diameter snags and down logs, promote the development of understory vegetation, maintain good crown ratios, and manage species composition.

- Maintain or enhance resource values within Riparian Reserves to meet the ACS objectives.

- Manage BLM-controlled road systems through various types of road closures and decommissioning to maintain, restore, or improve wildlife habitats, water quality, and hydrologic function. Reduce the open road density in accordance with the Transportation Management Objectives (TMO) on BLM-managed lands in the proposed action area.

- Limit spread of Port-Orford-cedar (POC) root rot disease (*Phytophthora lateralis* - PL) in the high risk areas (adjacent to roads and in riparian areas) and maintain POC populations in low risk areas.

<u>Issues Identified, Analyzed, but Not Used to Develop Action Alternatives:</u>

The following issues were identified during the EA process. Analysis of these issues did not suggest different alternatives, nor would they influence the decision. Therefore, they were not discussed further in this EA. The reasons that these issues merit exclusion from the body of the EA is included in Section B of the Analysis File.

- Peak Flow

- Survey and Manage Species

<u>Alternatives and Units Considered but Not Carried Forward:</u>

<u>Alternative to treat younger stands in the analysis area:</u>
Table 21 in the South Coast - Northern Klamath Late-Successional Reserve Assessment (LSRA, page 68) shows general priorities to be considered when treating stands in the LSR. High Priority stands are those less than 30-years of age. Treatments would manage the stand density to accelerate the growth of trees by reducing the effects of competition. Primarily, this would be accomplished through precommercial thinnings (PCT). The analysis area contains 1,022 acres of stands that are less than 30 years of age, of which approximately 70% have already been pre-commercially thinned. The remainder is either too young for treatment, has low stand density levels not requiring treatment, or is planned for PCT in the near future (62 acres). Therefore, in the analysis area, most all of the stands in this priority have already been, or are planned to be, treated.

<u>Alternative to treat stands and leave the thinned trees on site:</u>
An insect infestation risk assessment for the project area was completed by Dr. Donald Goheen, Entomologist/Plant Pathologist (see Attachment 3 in Appendix 5). The purpose of the trip was to consult with BLM managers about possible insect implications of cutting substantial numbers of Douglas-firs and leaving them on the ground. His conclusion was leaving cut trees on site in place would create perfect conditions for Douglas-fir beetle population to increase by providing large numbers of down trees of the proper size classes for brood population. There are Douglas-fir beetles in the area that potentially would infest the down trees and produce brood. Small endemic populations of these beetles survive in greatly weakened tress, especially in root disease centers such as laminated root rot which is found throughout the area. Beetles emerging from the down trees could be expected to kill substantial numbers of leave trees, and could kill trees in adjacent old-growth stands and on neighboring private

properties as well. Mortality patterns would be unpredictable. By killing the largest Douglas-firs and Douglas-firs in groups, desired stand structure and required crown closure would be negatively impacted (Goheen, 2000).

Thinning dense stands can make them less susceptible to infestation. However, if large amounts of down wood greater than 8 inches in diameter (20 cm) is left on site following thinning, beetles will have abundant breeding sites and population may increase to damaging levels (Ross, 1997). Douglas-fir beetle infestation of green trees occurs when brood has emerged from a fairly substantial number of down trees. Based on past experience, the threshold appears to be at least 4 down Douglas-firs $\geq$ 10 inches diameter per acre (Goheen, 2000). The more down hosts there are and the larger the size of the down trees, the greater the likelihood that emerging beetles will infest green trees and the larger the number of trees that will likely be infested. A treatment leaving 25 - 230 trees/acre on the ground would result in epidemic population growth of Douglas-fir bark beetles that would attack and kill standing green Douglas-fir trees. The Douglas-fir bark beetles often show a preference for the largest Douglas-firs in a stand and also often cause concentrated mortality, killing all of the trees in patches that vary in size from ¼ to 2 acres. Most commonly, beetle-caused mortality of standing Douglas-firs will be concentrated fairly near the downed trees initially attacked by the beetles. However, Douglas-fir beetles are strong fliers, and in a certain percentage of cases (10 to 20 percent), they infest trees one to 5 miles away from where they emerge (Goheen, 2000).

A fire risk assessment was also completed for the alternative of leaving thinned material on site. The results of this assessment determined that leaving thinned trees on site would rate out as a High Fuel Hazard. If ignition occurred in this fuel loading, it would likely create a stand replacement fire. The cured fuel load would also be completely impassable to firefighters, hampering suppression efforts without the use of large mechanized equipment. Detailed information dealing with fire and insect risks can be found in Appendix 5.

The design features include leaving one down tree per acre in all units and to creating one snag per acre in the north facing units. The design features for snags and down logs, along with the retention of existing components, meet the objectives set in the LSRA. The remainder of the thinned trees would be surplus to habitat needs. Detailed information can be found in Appendix 5.

Therefore, based on the issues for fire and insect risk, it was determined that removal of the thinned trees (except those left for down logs) would best promote the desired forest structure while minimizing risk to the stands in the LSR. Due to the issues raised concerning fire and insect risks, leaving thinned material on site would not be a viable alternative. However, the fire and insect risk assessments does support the action alternatives addressed in this EA.

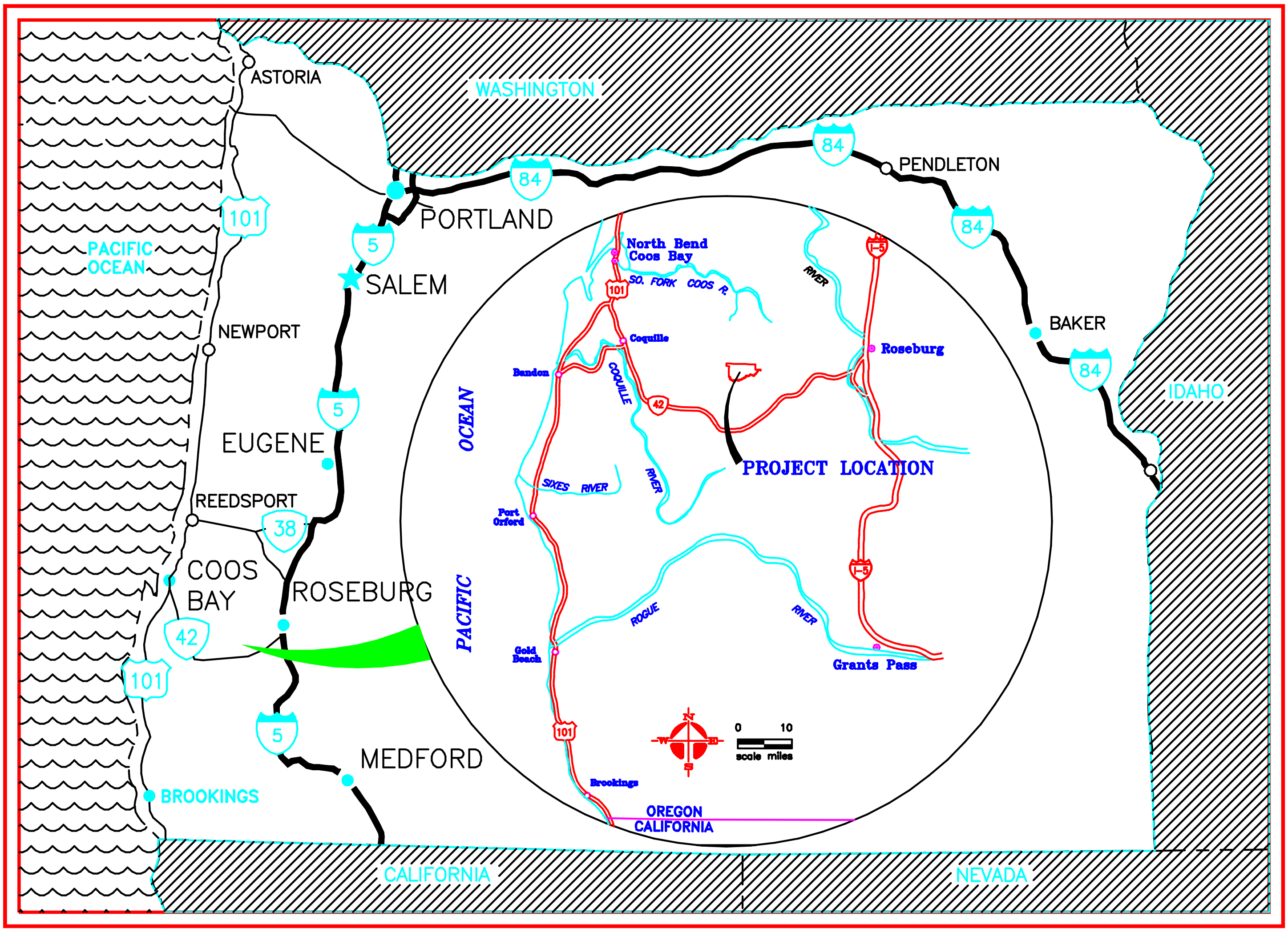
<u>Alternative to build new roads to access units for treatments:</u>
An alternative to build new roads to access units (or portions thereof) for skyline cable yarding was considered. However, the IDT decided to develop action alternatives that did not include new road construction in order to avoid potential negative short-term impacts to water quality and wildlife. To meet this intent, some units (or portions) incorporated ground-based or helicopter yarding systems and some potential areas were eliminated from consideration (detailed information can be found in Section C of the Analysis File).

Other units considered for treatment:
The East Fork Coquille Watershed Analysis identified approximately 1,060 acres that could be treated by density management thinning within the LSR land-use allocation in the Camas Analysis Area. Potential treatment units consisted of stands 30-50 years of age that appeared to be of a composition and density that would benefit from treatment. Stand exams were conducted in these units, as well as additional areas that were of the same age. This information was used by the Interdisciplinary Team to finalize the action alternative treatment areas (units). Most EA units had areas adjacent to them that were currently at a stand density and composition that the Team considered already on a trajectory toward developing late-successional characteristics. These areas were dropped from consideration for treatments at this time. Detailed information on units not included in the action alternatives can be found in Section C of the Analysis File.

Vicinity Map

Camas EA Analysis Area

Myrtlewood Resource Area
Coos Bay District BLM



II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternative I - No Action

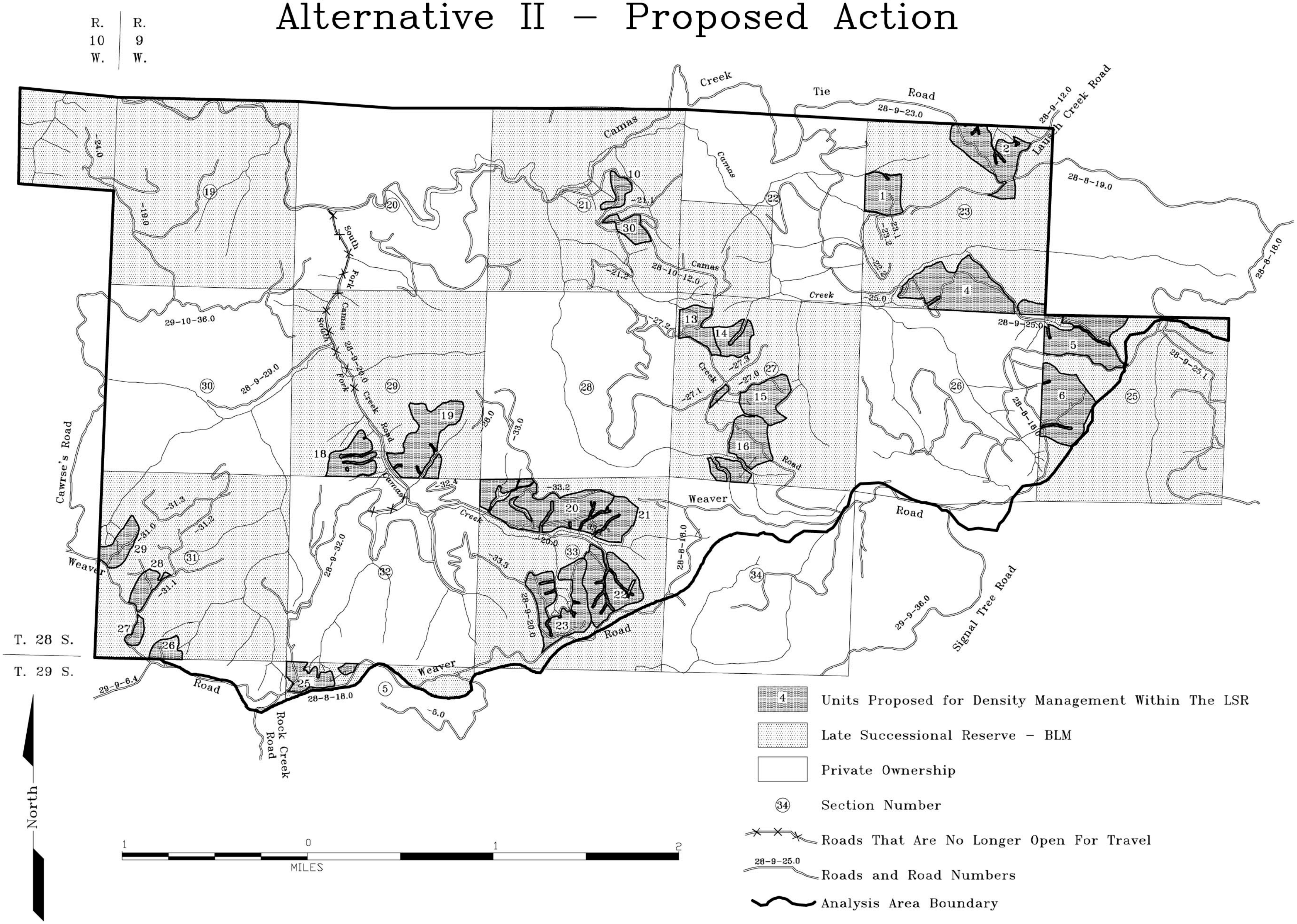
Under this alternative, the silvicultural treatments needed to promote desired stand characteristics within Riparian Reserves and uplands of the Camas Analysis Area portion of LSR #261 would not be applied at this time (contra TM-1.c., S&G p. C-32). Implementation of road decommissioning/closure recommendations in the E. Fork Coquille Watershed Analysis (Appendix J) would also be deferred.

Alternative II - Proposed Action

This alternative would treat 784 acres through density management thinning. This includes treating portions of Riparian Reserves (255 acres) associated with units to be treated. No-treatment buffers would be applied to streams within or adjacent to thinning units as needed to maintain bank/slope stability and shade. Density management thinning would remove a portion of the stands to provide room for the remaining trees to maintain or increase diameter growth. Trees cut but surplus to habitat needs would be removed for commercial use (see Appendix 5). Stand densities would average 60-155 trees per acre after treatment. Treatments would be accomplished using a variety of ground-based, skyline cable, and helicopter systems. The proposed projects would include renovation/improvement of 2.3 miles of existing roads (all of which would be decommissioned after use) and decommissioning/closing an additional 2.4 miles of existing roads. This alternative would enhance structural diversity through density management and begin to restore some late-successional habitat lost through previous management activities. Design features include retaining existing snags and down logs, leaving additional down trees after treatment, creation of snags, and releasing selected dominant trees. This alternative would set the stage for subsequent treatments that would maintain desired overstory and understory growth rates, initiate additional understory vegetation, and create snags and CWD when and where necessary.

This alternative could be accomplished by timber sale contracts sold in Fiscal Year (FY) 2002 and FY 2003, and/or service contracts, depending on funding. Appendix 2 contains detailed unit descriptions, Appendix 3 contains maps showing roads to be renovated and harvest system areas, and Appendix 4 contains road decommissioning and closure details.

Camas Analysis Area – LSR EA
Alternative II – Proposed Action



Alternative III - Alternative Action

This alternative would treat 491 acres through density management thinning. This alternative would not treat any Riparian Reserves. By not treating the Riparian Reserves, some upland areas would also not be treated (as compared to Alternative II) due to these areas being infeasible to treat.

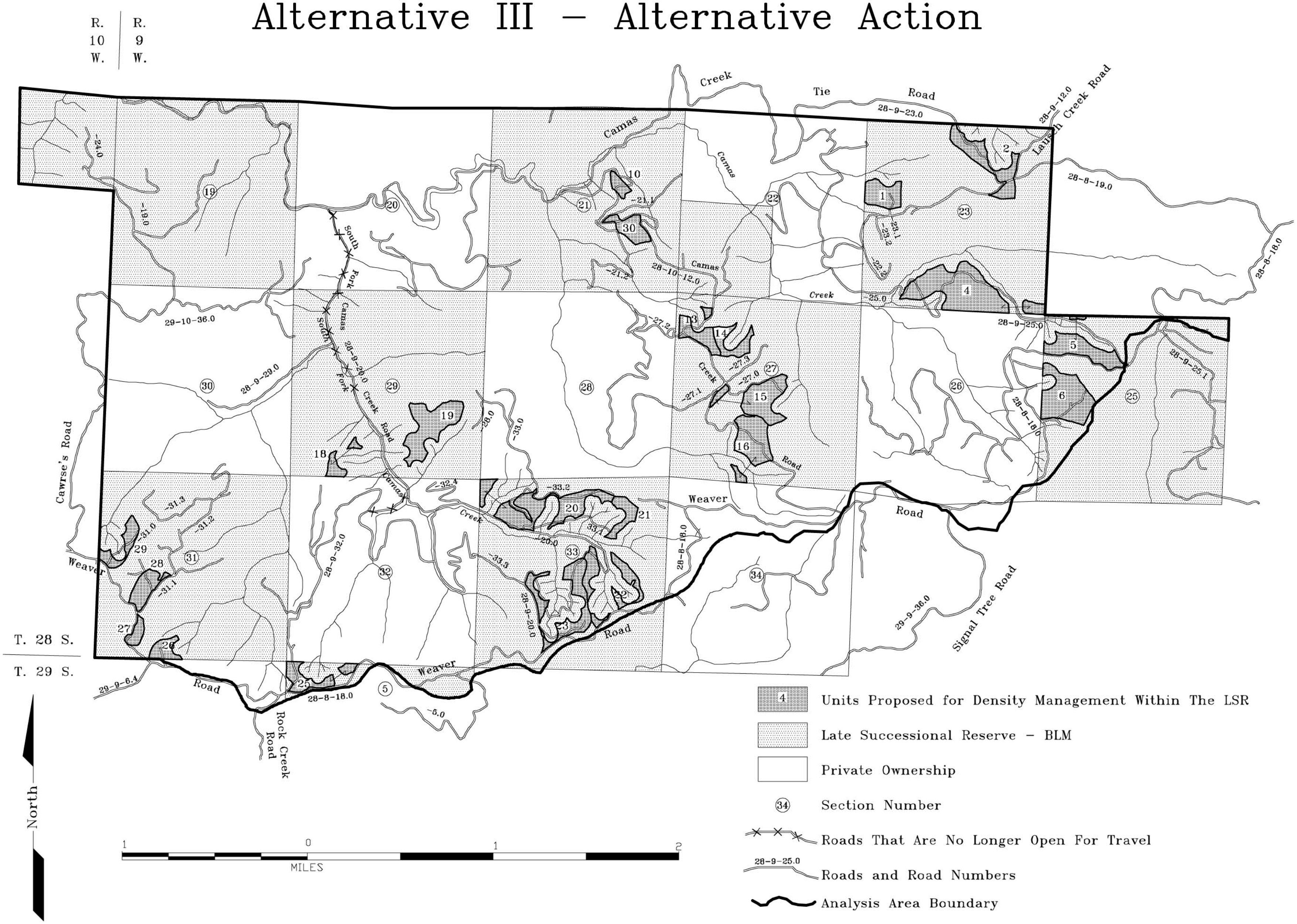
Density management thinning (on the 491 acres) would remove a portion of the stands to provide room for the remaining trees to maintain or increase diameter growth. Trees cut but surplus to habitat needs would be removed for commercial use (see Appendix 5). Stand densities would average 60-155 trees per acre after treatment. Treatments would be accomplished using ground-based, skyline cable, and helicopter systems. The proposed projects would include renovation/improvement of 2.3 miles of existing roads (all of which would be decommissioned after use) and decommissioning/closing an additional 2.4 miles of existing roads. This alternative would enhance structural diversity through density management and begin to restore some late-successional habitat lost through previous management activities. Design features include retaining existing snags and down logs, leaving additional down trees after treatment, creation of snags, and releasing selected dominant trees. This alternative would set the stage for subsequent treatments (except within Riparian Reserves) that would maintain desired overstory and understory growth rates, initiate additional understory vegetation, and create snags and CWD when and where necessary.

This alternative could be accomplished by timber sale contracts sold in Fiscal Year (FY) 2002 and FY 2003, and/or service contracts, depending on funding. Appendix 2 contains detailed unit descriptions, Appendix 3 contains maps showing roads to be renovated and harvest system areas, and Appendix 4 contains the road decommissioning and closure details.

Design Features for Action Alternatives and Monitoring

Design features and monitoring can be found in Appendix 1.

Camas Analysis Area – LSR EA
Alternative III – Alternative Action



III. AFFECTED ENVIRONMENT

Additional information can be found in the E. Fork Coquille Watershed Analysis.

VEGETATION: The Camas Analysis Area lies within the Western Hemlock and Cool Hemlock Vegetation Zones (LSRA, 1998). The Cool Hemlock Zone generally occupies elevations above 1800' and is located along the higher south and east portions of the analysis area. Douglas-fir and western hemlock are the dominant overstory species in this zone. However, Port-Orford cedar and western red cedar may be found as overstory components. Understory species include rhododendron, Oregon grape, and salal. The Western Hemlock Zone is similar to the Cool Hemlock Zone in species composition, except, the overstory is dominated with more Douglas-fir and less hemlock. Hardwoods including big leaf maple, red alder, and golden chinkapin are more likely to be found as understory species in the Western Hemlock Zone.

Approximately 63% of the current late-successional habitat (stands greater than 80 years old) was established around 1700 and most likely initiated after large stand-replacing fires. The remaining 37% of late-successional stands were initiated between 1810 and 1890; which may have been the result of natural fires, human-caused fires, or logging. However, logging did not start in earnest until the mid 1900's, with 57% of BLM-administered lands in the analysis area harvested and replanted after 1940. These stands are the product of intensive forest management.

WILDLIFE: Numerous species of wildlife are present in the analysis area. Big game species include Roosevelt elk, black-tailed deer, black bear, and mountain lion. The area also supports populations of furbearers such as mink, long-tailed weasel, beaver, and possibly American marten and fisher. Numerous species of birds include resident and neo-tropical migratory songbirds. Upland game birds include ruffed grouse, California quail, and mountain quail. Small mammals include several species of shrews, porcupines, brush rabbits, and squirrels. Reptiles in the area include fence lizard, northern alligator lizard, probably the rubber boa, and two species of garter snake. Amphibians include southern torrent, clouded, Dunn's, western red-backed, and ensatina salamanders.

In western Oregon and Washington, snags are used by more than 90 species of wildlife, 53 of which are considered dependant on cavities. Snag surveys conducted in the East Fork Coquille Watershed (which contains the analysis area) in mid-seral stands (30-80 years old) show that snags are deficient on the north-facing slopes.

GEOLOGY /SOILS: The Camas Creek Subwatershed is overlaid with the Tyee Formation (Baldwin, 1973). This is a thick sequence of rhythmically bedded micaceous sandstone and siltstone. The formation is layered on top of the Flournoy formation in the lower reaches of Camas Creek and the west portion of the sub-watershed. The indistinct micaceous siltstone is mixed with massive beds of sandstone which are often seen as bedrock outcroppings on the landscape or in the channel bottoms. The weathering of the Tyee Formation produces much coarse sand and cobble materials in the channels. The Flournoy Formation with its siltstone component weathers to finer materials and can produce turbidity in the stream longer than that of the sandstone areas.

The soil types most common to the sub-watershed are: 14F Digger-Preacher-Umpcoos association, 15F Digger-Umpcoos-Rock Outcrop association, 46D, 46E, 46F Preacher-Bohannon loams, 50D, 50E Remote-Digger-Preacher complex, and Umpcoos-Rock Outcrop association 58F. Most of these soils formed in colluvium and residuum derived dominantly from arkosic sandstone. These soils allow for rapid infiltration, moderate amounts of water storage, and are somewhat prone to surface erosion. Soil types 14F, 15F and 58F are shallow and have somewhat reduced storage capacities when associated with high rock contents or surface bedrock. A complete discussion of the soil properties and limitations is contained in the Soil Survey of Coos Co., Oregon, 1989.

1. GEOMORPHOLOGY/HYDROLOGY/WATER QUALITY: The project area is within the South Fork Camas (3,345 acres) and East Fork Camas (5,426 acres) drainages of the East Fork Coquille watershed, and involves 11% of the drainages. Elevations in the drainages range from 1,100 to 3,100 feet. Most of the analysis area is within the transient snow accumulation zone (considered to be above 1,800 feet in the analysis area). Eighty-nine percent of the forest vegetation in the Camas subwatershed is older than 20 years of age, as the majority of the watershed was harvested during the 1960's decade (BLM, EFCWA 2000). Because of the regrowth of forests in these drainages, stream flow (annual yield) is predicted to be similar to undisturbed mature stands (Hicks et al 1991). Stream channels in the project area are generally headwater, steep cascading and step-pool channels confined by hillslopes. Drainage density is very high at 8.07 mi/mi^2. Streambed particle size distributions in Camas Creek are typical of the interaction of hillslope and fluvial processes and fine sediments in the mainstem are at or below expected amounts (BLM, EFCWA 2000). Water quality in Camas is normally excellent. In a turbidity monitoring study in the winter of 1995-6, BLM found that the water clarity seldom exceeded 10 nephelometric turbidity units (NTU). Although the East Fork Coquille River is listed for temperature on Department of Environmental Quality's 303(d) list, steam channels in the project area are generally intermittent during the summer and/or fully shaded.

FISHERIES & AQUATIC HABITAT : The Camas Creek watershed supports populations of coastal cutthroat trout, Pacific lamprey, brook lamprey, speckled dace, prickly sculpin, and reticulate sculpin. With the exception of Pacific lamprey, these are resident populations, isolated by a natural barrier downstream of the analysis area, where the E. Fork Coquille River flows through Brewster Gorge. The fish ladder constructed in Brewster Gorge in the late 1980s is not functional at present. Winter steelhead were observed in the lower portions of mainstem Camas Creek during the early 1990s when the Brewster Gorge fish ladder was functional. Juvenile coho salmon were released into Camas Creek by Oregon Department of Fish and Wildlife (ODFW) for a number of years during the late 1980s and early 1990s, but no adults were observed above Brewster Gorge during subsequent years of spawning ground surveys. The analysis area is within the Oregon Coast coho salmon Evolutionarily Significant Unit (ESU), which is listed as threatened under the Endangered Species Act (ESA). However, the project area is over 12 river miles upstream from the nearest coho salmon habitat, as illustrated in the E. Fork Coquille WA (Map A.17). Oregon Coast steelhead and coastal sea-run cutthroat trout are federal candidate species; stock status reviews are ongoing to determine if future listings may be warranted. Additional information on fish stocks can be found on pages IV-28 through IV-41 of the East Fork Coquille Watershed Analysis.

Intermittent 1st- and 2nd-order streams, seeps, or springs, and perennial 1st- and higher-order streams are present throughout the Camas Analysis Area. Both fish-bearing and non fish-bearing streams are represented. All streams analyzed are classified as small or medium non-fish, or medium fish-bearing according to 1994 Oregon Forest Practice Rules and Statutes (OAR 629-635-200).

Proposed density management thinning Units 4, 18, & 19 contain within them, or are adjacent to, fish-bearing streams containing resident cutthroat trout. All other streams within and adjacent to thinning units are non-fish bearing. This determination was based on topography and fish distribution maps, stream gradient measurements, 1999 stream habitat inventory data, and visual evaluation of critical habitat components. The upper extent of fish distribution in S. Fork Camas Creek and the two 3rd-order tributaries in T28S-R09W-27 was verified by electro-fishing during the spring of 2000.

Aquatic habitat inventory data for the analysis area is presented in the E. Fork Coquille Watershed Analysis, Appendix H, Table H.11. Table 1, Section J of the Analysis File, presents additional habitat inventory data for the analysis area, which was collected by ODFW during the summer of 1999. In summary, the 1992-99 inventories indicate that pool habitat is fairly abundant throughout the surveyed portions of Camas Creek. Most reaches that rated poor with respect to the pool area and/or pool frequency are Rosgen type A or Aa+ channels, where pools typically are not well represented due to the steep gradients. Most pools in surveyed reaches rated fair to good with respect to residual pool depth and pool complexity. Most surveyed reaches of Camas Creek have fair to good width-to-depth ratios - probably because most surveyed reaches are Rosgen A or B-type channels, which are fairly resilient with respect to width-to-depth ratio.

The most striking differences among the surveyed reaches involve the riffle substrate and large woody debris (LWD) parameters. On mainstem Camas Creek (5th order B-type channel), riffles contain very low amounts of sand, silt and organic matter, and LWD is in very low abundance. In contrast, fine sediments (silt, sand, and organic material) are abundant, even prevalent, in the riffles of its tributaries (Tables 1 & H.11, Section J of the Analysis File). These results seem to be counterintuitive, given that the surveyed tributaries are Rosgen A or Aa-type channels (which are generally considered to be high transport streams) and occur in a drainage with relatively high transport efficiency, as noted in the E. Fork Coquille Watershed Analysis, Map A.11 and Figure IV.2. High fine-sediment loading in riffles could be interpreted as the result of excessive fine-sediment delivery and/or a stream's inability to adequately sort, store, and transport sediments. However, the sorting and storage of fine sediments is a function of LWD loading in Rosgen type A and B channels; LWD generally enhances in-channel storage capacity and dissipates energy such that fine sediments are not exported as readily. LWD loading is also notably higher in the five surveyed tributaries. Thus, the disparity in riffle substrates between mainstem Camas Creek and its high-gradient tributaries appears to be attributed to differences in LWD loading.

RIPARIAN RESERVES: The Camas Analysis Area contains about 3,970 acres of interim Riparian Reserve on BLM-managed lands. The age-class distribution within the Riparian Reserve is as follows: 0-40 yrs (51%), 41-80 yrs (14%), 81-120 yrs (6%), 121-160 yrs (8%), 161-200 yrs (trace), and 200+ yrs (21%). The proposed density management treatment units and adjacent Riparian Reserves are 32 to 45-year-old managed stands that were planted after timber harvests in the late 1950s and 1960s. These stands presently have an average density of 158-385 trees/acre, with 100% canopy closure and relative densities of 43-72. Based on research presented in Tappeiner et al. (1997), the proposed density management treatment units and the associated Riparian Reserves are not on a trajectory that is conducive to development of late-successional/old-growth forest habitat. The conditions found within these Riparian Reserves are the result of a combination of past management activities (harvest, site preparation burning, planting, precommercial thinning and fertilization) and are probably not within the range of natural variability.

While the majority of the Riparian Reserves contain low to moderate amounts of soft, embedded, down logs from previous harvest (decay class 3+); "hard" (class 1 and 2) down logs are virtually absent. Only 21% of Riparian Reserves stands in the analysis area are greater than 160 years old. It is at this age that trees reach a size that contribute appreciably to large wood recruitment to streams (Spies et al.1988). Over the next forty years, self-thinning in riparian stands 120-160 years old (8% of Riparian Reserve) should begin to provide class 1 logs to riparian forests and streams. However, because the majority of stands in the analysis area are <40 years old, it will take up to 120 years to reach optimal wood recruitment levels in Riparian Reserves. Additional information on the condition of Riparian Reserves can be found in the E. Fork Coquille Watershed Analysis (pp. V-1 - V-12) and Riparian Reserve Evaluation (pp. VII-3 - VII-26).

<u>TRANSPORTATION SYSTEM:</u> At present, the open road density on BLM-managed lands within the Camas Creek Subwatershed is approximately 3.64 mi/mi^2. The road systems access both federal and private lands. Consequently, the BLM has existing reciprocal right-of-way agreements with Georgia Pacific-West and Lone Rock Timber Company. These reciprocal right-of-way agreements give all land owners access to their lands, and at the same time, reduce road density by eliminating the need for duplicate road systems.

The BLM controls approximately 52% (53 miles) of the transportation system (101 miles total) in the Camas Creek Subwatershed. Approximately 85% (45 miles) of the BLM-controlled roads are either gravel or bituminous surfaced. Unsurfaced roads in the analysis area fall into two categories: either newly constructed roads or old roads in some stage of hydrologic recovery. Based on field observations, most older dirt spurs and roads on BLM-managed lands are not contributing sediment to stream channels from their surfaces.

IV. ENVIRONMENTAL CONSEQUENCES

<u>Alternative I - No Action</u>

Under this alternative, density management treatment to promote the development of late-successional conditions and road decommissioning would not take place at this time.

Direct, Indirect, and Cumulative Effects (Alt. I)

Development of Late-Successional Characteristics (Issue 1)

Key Indicators: Growth Rate Acceleration

The No-Action Alternative is expected to maintain the existing developmental trajectory of Riparian Reserve and upland stands that were identified and recommended for treatment in the E. Fork Coquille Watershed Analysis (pp. VIII-5 & A-26). Tappeiner et al (1997) indicates that over stocked managed stands, such as those in the analysis area, are not on a trajectory that is likely to attain desired old-growth characteristics. Successfully resetting the developmental trajectory of these stands depends on applying the appropriate silvicultural treatment within a prescribed time interval. Deferring silvicultural treatments at this time may preclude the attainment of some ACS objectives (especially #8 & 9) and the potential for these stands to acquire desired stand characteristics. The slow growth anticipated under the No-Action Alternative would result in a concomitant delay in recruitment of the desired quantity and quality of coarse woody debris to streams, and the forest floor in Riparian Reserves and uplands. It would also delay the attainment of habitat characteristics that benefit late-successional dependant species such as the northern spotted owl and marbled murrelet.

In the analysis area, approximately 715 acres of stands less than 30 years of age have been precommercially thinned. Precommercial thinning on another 62 acres is planned in the near future. The purpose of precommercial thinning is to accelerate tree growth by reducing the effects of competition. Cumulatively, this sets 777 acres on a trajectory of accelerated tree growth within LSR #261. This alternative would not contribute any additional acreage of accelerated tree growth.

Key Indicators: Understory Development

The understory component (forbs, shrubs, and seedlings) in the majority of stands proposed for density management is sparse and suppressed at present, largely due to heavy shading from closed canopies. Deferring silvicultural treatments at this time would preclude understory development for the foreseeable future. Understory development eventually creates multi-layered stands which may, in turn, maintain or enhance plant and wildlife species diversity.

Key Indicators: Stand Composition (Heterogeneity, species diversity, & structures)

Managed stands, like those being analyzed, typically have fewer tree species, more uniform tree size and spacing, and a lower number and volume of large snags and logs than their naturally generated counterparts (Spies & Franklin 1991). Snag surveys conducted in the East Fork Coquille Watershed (which contains the analysis area) in mid-seral stands (30-80 years old) show that snags are deficient on the north-facing slopes. The No-Action Alternative is expected to perpetuate the existing conditions and does not promote restoring these stands into more desirable, complex habitats. Without thinning, upland stands would remain primarily homogeneous, dominated with Douglas-fir, lacking representative proportions of other species such as hemlock, cedar, and hardwoods. The development of late-successional forest characteristics (such as large crowns, large moss-covered limbs, snags, and down logs) would be delayed. In addition, this scenario is not conducive to the attainment of the desired conditions and management objectives for Riparian Reserves in the Camas Creek subwatershed, which are described on pp. V-4, V-12 & V-13 of the E. Fork Coquille Watershed Analysis. Key structural habitat components such as snags and down logs, which are critical for the persistence of many wildlife species, would not be created.

Past precommercial thinning created evenly spaced young stands and favored leaving Douglas-fir. This limits the development of spatial and species diversity that is desired in the LSR. The 62 acres planned for precommercial thinning would have prescriptions that promote desired stand conditions, such as leaving minor species and retaining hardwoods. This alternative would not promote development of late-successional characteristics on any additional acreage.

Roads (Issue 2)

Key Indicator: Open Road Density

Table 1: Road Density

	Alt. I	Alt. II	Alt. III
Open road density (miles/sq. mile)[2]	3.64	3.30	3.30

[2] Open roads = roads accessible to motorized vehicles. Target open road density in the FRMP is 1.1 miles/sq. mile with a maximum of 2.9 miles/sq. mile.

Road density would remain at current levels (3.64 mi/mi^2). There are no direct or indirect effects to open road density under the No-Action Alternative. Implementation of the road decommissioning/closure recommendations (specific to the Camas Analysis Area) in the E. Fork Coquille Watershed Analysis (Appendix J) would be deferred. Future road decommissioning within the Camas Analysis Area would be dependent on availability of funding from other [unspecified] sources. Some road closures are expected to occur through other management activities, such as Job-in-the-Woods. Road density on private lands may increase as new roads are constructed or old roads are reopened to harvest private lands.

Key Indicator: Impacts to Wildlife

The existing open roads within the analysis area would perpetuate the current level of disturbance to wildlife, discouraging the use of habitats adjacent to these open roads. No new roads would be constructed; therefore, no new barriers (corridors or graveled surfaces) to movement would be created. Since open road density on BLM would remain the same, the potential for loss of roadside down log habitat through theft would not change. The overall effect of the No-Action Alternative would be continued road-related disturbance to wildlife and impacts to wildlife habitat at the current level. None of the recommended road decommissioning proposed under the action alternatives would be completed at this time. Barrier effects of roads on wildlife movements will remain unchanged. Decreased connectivity of habitats (fragmentation) due to road barriers limits the ability of some wildlife species to recolonize habitats and isolates populations, making them more susceptible to local extirpation.

<u>Alternative II - Proposed Action</u>

Direct, Indirect, and Cumulative Effects (Alt. II)

<u>Development of Late-Successional Characteristics (Issue 1)</u>

Key Indicators: Growth Rate Acceleration

Numerous citings in the literature, such as Weinkel et al (1997) and Hayes et al (1997), speak to the benefits of thinning to promote late successional conditions. Thinning can move stands out of the closed-canopy stage and accelerate conditions found in late-seral forests. Some of the structural characteristics found to be lacking in young forests, but typical to older forests are large live trees, deep fissured bark, large-diameter snags, and large-diameter logs. Also lacking in young forests are multi-canopy layers composed of a well-developed understory and diverse tree species, especially the presence of hardwoods.

Stand Projection System (SPS) modeling summarized in Table E-4, Section E of the Analysis File, illustrates the acceleration in growth expected as a result of the proposed density management prescriptions. Accelerated growth would increase the quantity and quality of coarse woody debris to streams, and the forest floor in Riparian Reserves and uplands. It would also accelerate the attainment of habitat characteristics that benefit late-successional dependant species such as the northern spotted owl and marbled murrelet.

It is anticipated that these stands will require subsequent treatments before they reach 80 years of age. These future treatments, in concert with the proposed treatments, would continue the desired growth trajectory and restore managed stands into more desirable, complex habitats.

In the analysis area, approximately 715 acres of stands less than 30 years of age have been precommercially thinned. Precommercial thinning on 62 acres is planned in the near future. The purpose of precommercial thinning is to accelerate tree growth by reducing the effects of competition. This alternative would treat an additional 784 acres, accelerating tree growth on a total of 1,561 acres within LSR #261.

Key Indicators: Understory Development

Treatments result in approximately 60% canopy closure, which would facilitate understory (shrub layer) development for the first decade. A well-developed understory provides cover for birds that nest on the ground, such as the dark-eyed junco. Wilson’s warblers, Swainson’s thrush, and many other species build their nests in the shrub layer. Understory plants also offer forage and protective cover for many other species. Increased forage promotes the use of thinned stands by ungulates in some areas. The abundance of some species of small mammals is positively related to shrub cover in forest stands. However, the canopy is expected to close again within 15 years after treatment, which would effectively stall understory development. The proposed treatment is perceived as a first step toward attaining the desired understory characteristics described on pages V-12 & V-13 of the E. Fork Coquille Watershed Analysis.

It is anticipated that these stands will require subsequent treatments before they reach 80 years of age. These future treatments, in concert with the proposed treatments, would continue to promote the development of shade-tolerant understory tree and shrub species typical of old-growth forest habitats in the Coast Range.

Key Indicators: Stand Composition (Heterogeneity, species diversity, & structures)

Treatments in the analysis area consist of moderate to heavy thinning, which would promote the development of species diversity. Thinning to a moderate level would aid in stimulating understory development and ground cover species, while a heavier thinning will favor the establishment and growth of conifer seedlings, shrubs and hardwoods (Hayes et al 1997). Also, selection of residual trees with less emphasis on tree spacing allows for the retention of minor conifer species and hardwoods. Proposed thinning densities vary throughout the analysis area. Variability in leave tree density, along with thinning from below (less emphasis on tree spacing), would promote heterogeneity within the stands as well as across the landscape.

Thinning would accelerate the growth of trees, thereby contributing to future recruitment of large snag and down wood. Cavity nesting birds are of a special concern for forest managers, because they require standing dead trees for nesting. Many species of cavity-nesting birds, including the chestnut-backed chickadee, red-breasted nuthatch, brown creeper and hairy woodpecker, are more abundant in old-growth forests than in young forests. The abundance of these species is associated with the abundance of large diameter snags, which cavity-nesting birds use as nesting habitat, and the abundance of large-diameter live conifers, often used for foraging. Cavity-nesting birds are abundant in stands with a diverse composition of tree species and well-developed understory vegetation. Recent studies suggest that cavity-nesting birds are more abundant in young stands that have been commercially thinned than in similar unthinned stands (Weinkel et al 1997).

Design features include: retention of existing snags and down wood, topping of trees to create additional snags, and leaving additional trees for down wood. Although the additional snag and down wood created would be small in size, they would provide short-term benefits to wildlife. After treatment, the level of snags retained would exceed the amounts recommended in the LSRA (page 82). The amount of down wood retained after treatment would be within the range expected to be found in young stands (Down Wood Calculations, Appendix 5).

Thinning in stands 30-50 years old, such as those selected for thinning in the Camas Analysis Area, promotes the restoration of old-growth stand characteristics, including development of large crowns on the dominant and co-dominant trees. Large crowns provide larger areas and nesting opportunities for birds like the marbled murrelet and habitat for the red tree vole. Nest sites of northern spotted owls (Forsman et al 1984) and marbled murrelets (Hamer and Nelson 1995) are most abundant in stands with large-diameter trees. Deep fissures in the bark, typical of old growth Douglas-fir, provide roosts for eight species of bats in western Oregon and Washington. Some species of spiders and insects are known to increase in abundance in response to thinning; spiders are an important prey item for the brown creeper.

It is anticipated that these stands will require subsequent treatments before they reach 80 years of age. These future treatments, in concert with the proposed treatments, would continue to foster species diversity, develop younger cohorts of trees to promote multi-storied canopies, and provide additional snag and down log habitats.

Past precommercial thinning in the analysis area created evenly spaced young stands which favored leaving Douglas-fir. This limits the development of spatial and species diversity that is desired in the LSR. The 62 acres planned for precommercial thinning would have prescriptions that promote desired stand conditions, such as leaving minor species. With the 784 acres treated in this alternative, a total of 846 acres would be treated to promote development of late-successional characteristics within the LSR.

<u>Roads (Issue 2)</u>

Key Indicator: Open Road Density

The proposed projects would include renovation/improvement of 2.3 miles of existing roads (all of which would be decommissioned after use) and decommissioning/closing an additional 2.4 miles of existing roads.

There is no new road construction associated with this alternative. The result of the proposed road decommissioning in this alternative is a reduction in open road density on BLM-managed land from 3.64 to 3.30 mi/mi^2 (Table 1, page 15) in the Camas Creek Subwatershed. This would move the road density toward the target of 1.1 mi/mi^2.

Additional road closures are expected to occur through other management activities, such as Job-in-the-Woods. These activities combined with decommissioning proposed in Alternative II further contribute to attaining the target road density on BLM. However, overall open road densities in the analysis area may not decrease if new roads are constructed or opened on private lands.

Key Indicator: Impacts to Wildlife

Overall, this alternative would provide a net benefit to wildlife, because of the amount of road decommissioning.

Alternative II would renovate/improve 2.3 miles of existing roads (all of which would be decommissioned after use) which may result in short term impacts to some less mobile wildlife species. After decommissioning, barrier effects of these roads would decrease as they revegetate and reconnect adjacent habitats.

This alternative decommissions/closes an additional 2.4 miles of existing roads. The proposed reduction in open road density would result in less disturbance to wildlife, and should allow increased utilization of available habitat. A reduction in open road density could also decrease the amount of roadside down-log habitat removed through theft.

<u>**Alternative III - Alternative Action**</u>

Direct, Indirect, and Cumulative Effects (Alt. III)

<u>Development of Late-Successional Characteristics (Issue 1)</u>

Key Indicators: Growth Rate Acceleration

In the analysis area, approximately 715 acres of stands less than 30 years of age have been precommercially thinned. Precommercial thinning on 62 acres is planned in the near future. The purpose of precommercial thinning is to accelerate tree growth by reducing the effects of competition. This alternative would treat an additional 491 acres, accelerating tree growth on a total of 1,268 acres within LSR #261.

All other effects to the uplands are the same as Alternative II, while the effects to the Riparian Reserve are the same as the No-Action Alternative.

Key Indicators: Understory Development

The effects to the uplands are the same as Alternative II, while the effects to the Riparian Reserve are the same as the No-Action Alternative.

Key Indicators: Stand Composition (Heterogeneity, species diversity, & structures)

Past precommercial thinning in the analysis area created evenly spaced young stands which favored leaving Douglas-fir. This limits the development of spatial and species diversity that is desired in the LSR. The 62 acres planned for precommercial thinning would have prescriptions that promote desired stand conditions, such as leaving minor species. With the 491 acres treated in this alternative, a total of 553 acres would be treated to promote development of late-successional characteristics within the LSR.

All other effects to the uplands are the same as Alternative II, while the effects to the Riparian Reserve are the same as the No-Action Alternative.

<u>Roads (Issue 2)</u>

Pertaining to all Key Indicators (Open Road Density, Impacts to Wildlife), the effects are the same as Alternative II.

Other Environmental Effects

None of the EA units are in or near 1) Areas of critical environmental concern, 2) Farm lands, prime or unique, 3) Flood plains, 4) Wild and scenic rivers, or 5) Wilderness values. Therefore, none of the alternatives have impacts on these resources.

Common to All Action Alternatives

Air Quality

Any prescribed burning of slash piles associated with yarding would adhere to smoke management/air quality standards of the Clean Air Act and State Implementation Plan.

Cultural Resource Values

The Camas Analysis Area probably has been the location of both prehistoric and historic cultural activities. Field reconnaissance did not reveal the presence of any cultural resources. Therefore, this project is not expected to effect prehistoric or historic cultural resources. However, if any potential cultural resources are encountered during project-related work, all work in the vicinity should stop and the District Archeologist must be notified at once.

Native American Treaty Rights

The Camas Analysis Area is within the boundaries of traditional territory described for the Coquille Indian Tribe. Although the Coquille Indian Tribe signed two treaties with the United States (in 1851 and 1855), neither were ratified by the Congress, and so are not in force. In 1996, Congress created the “Coquille Forest”, composed of fifty-four hundred acres of formerly BLM-managed land within the Coos Bay District. None of this acreage is within the analysis area. Nevertheless, the District has been involved with the Coquille Indian Tribe in the coordination of planned activities. None of the proposed alternatives are expected to affect Tribal uses.

Hazardous Materials/Solid Waste

No hazardous materials have been found to date in the action alternative units. Section R of the Analysis File contains the HazMat review. All Action Alternatives are subject to Federal and State regulatory guidelines for petroleum product use and storage. Spill Prevention, Control and Countermeasure Plans (SPCC) are required under the Oregon Forest Practices Act (Rule OAR 629-57-3600) and by Department of Environmental Quality (Rule OAR 340-108, inclusive). Spill containment capabilities on equipment sites are recommended.

Threatened and Endangered Species

The analysis area is within the range of four federally listed Threatened and/or Endangered Species: the northern spotted owl, marbled murrelet, bald eagle, and Oregon Coast coho salmon. In addition, critical habitat for northern spotted owl and the marbled murrelet has been designated in the analysis area. Impacts to these species and their critical habitat have been addressed in consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. All mandatory terms and conditions from the Biological Opinions have been or will be incorporated/implemented in accordance with the Endangered Species Act.

<u>Northern Spotted Owl</u>
Density management thinning would modify foraging and dispersal habitat of eight known owl sites that have all or a portion of their home range within the Camas Analysis Area Late-Successional Reserve (LSR). Three of these owl sites have an associated alternate site center. The action alternatives of this proposal would result in a "May Affect, Not Likely to Adversely Affect" (NLAA) determination for the northern spotted owl and its designated critical habitat since suitable habitat will not be removed and/or degraded.

<u>Marbled Murrelet</u>
Density management thinning activities are expected to facilitate the development of future murrelet nesting habitat by increasing tree and limb growth rates. The action alternatives of this proposal would result in a "May Affect, Not Likely to Adversely Affect" (NLAA) determination for the marbled murrelet and its designated critical habitat since thinning will not remove or degrade suitable habitat and all adjacent suitable habitat will have completed two years of marbled murrelet survey protocol prior to harvest. If additional occupied behavior is detected, these sites will be delineated and affected units will be dropped or harvest season will be modified as appropriate.

<u>Bald Eagle</u>
No bald eagles are known to nest within the Camas Analysis Area although in the early 1990's there was an active nest documented within the East Fork Coquille watershed. All surveys to date indicate the site has most likely been abandoned. Suitable habitat is present along the East Fork Coquille River. Nests averaged 0.5 mile from water in Oregon (U.S. Fish and Wildlife Service, 1986). If it is determined that eagles are nesting within the project area, impacts will be consulted on and management recommendations will meet the objectives outlined in the 1986 Recovery Plan for the Pacific Bald Eagle.

<u>Coho Salmon</u>
Camas Creek is within the Oregon Coast coho salmon ESU. However, the project area is over 12 river miles upstream from the nearest coho salmon habitat, as illustrated in the E. Fork Coquille WA (Map A.17). Furthermore, the haul routes for the action alternatives are paved, except in the immediate vicinity of the density management units. Given the remoteness of the project area from the nearest coho salmon habitat, the paved haul route, protection afforded by the no-harvest buffers, consistency with the ACS objectives (see Section K), conformity with the NMFS March 18, 1997 Biological Opinion, and the additional provisions of the design features, the action alternatives were determined to have no effect on Oregon Coast coho salmon or designated critical habitat.

<u>Essential Fish Habitat</u>
The analysis area does not contain "Essential Fish Habitat", as defined in the Magnuson-Stevens Act. The nearest essential fish habitat is at least 12 river miles downstream from the proposed treatment units. As described in the preceding paragraph, the action

alternatives would have no effect on Oregon Coast coho salmon. Based on this information the action alternatives would not affect essential fish habitat.

Survey and Manage Species

Red Tree Vole

If required, surveys for red tree voles will be conducted using the procedures described in BLM Instruction Memorandum No. OR-2000-037. Management of known sites and new sites discovered during protocol surveys will follow the management recommendations provided in the aforementioned Instruction Memorandum or any future direction.

Del Norte Salamander

Pre-disturbance surveys are not required under the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standard and Guidelines* (Interagency, 2001) (S&M SEIS). However, protocol surveys for the Del Norte Salamander were completed prior to the implementation of the S&M SEIS. Suitable habitat was searched but no Del Norte salamanders were located. The analysis area is approximately 13 miles north of the known range of this salamander.

Vascular Plants, Bryophytes, Lichens, and Fungi

Protocol for surveys and management will follow the guidelines established in the S&M SEIS. Field surveys for Survey and Manage plant species (vascular plants, lichens, and bryophytes) will be done according to approved survey protocols. There are no fungi species within the analysis area that require pre-disturbance surveys under the S&M SEIS. Some surveys (for plant and fungi species) were completed prior to the implementation of the S&M SEIS. Surveys so far have located the following Survey and Manage Species: *Diplophyllum albicans* (bryophyte), *Craterellas tubaeformis* (fungi), and *Sarcosoma latahense* (fungi). Management of these and any other Survey and Manage species will follow approved management recommendations. The intent of these recommendations is to ensure local species persistence.

Noxious Weeds

Noxious weeds, such as Scotch broom, French broom, gorse, and tansy ragwort are currently scattered throughout the analysis area and occur primarily along roads and in disturbed areas. Any disturbance is likely to increase the chances of noxious weed infestation. The best management practices outlined in Partners Against Weeds - An Action Plan for the BLM, Appendix 4 (Jan. 1996), along with the design features outlined in the action alternatives (i.e., washing of vehicles prior to entry and mulching/seeding), would help prevent introduction and reduce the spread of noxious weeds.

Sensitive Plant Survey

No negative impacts are expected to any special status plant species occurring within the analysis area. Surveys for those species suspected to occur within the analysis area is currently ongoing. If locations of special status plants are found, appropriate protection measures will be implemented. A description of the special status plant pre-field review is included in Section N of the Analysis File.

Irreversible and Irretrievable Commitment of Resources

Some irreversible and irretrievable commitment of resources would result from the proposed actions. Crushed rock from quarries would be committed to reconstruction and construction of the road system. Energy used to grow, manage, and harvest trees, and in other management activities is generally irretrievable. Irreversible and irretrievable commitments as stated above are discussed in the Coos Bay District FRMP.

V. LIST OF PREPARERS

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Appendix

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Appendix 1

Design Features for Action Alternatives and Monitoring

May 1, 2001

Appendix 1

Design Features for Action Alternatives

The objective of these design features is to ensure that the treatments protect and enhance conditions of late-successional forests ecosystems, which serve as habitat for late-successional and old-growth forest related species. Late-Successional Reserves (LSRs) are designed to maintain a functional, interacting late-successional ecosystem.

! Require one-end suspension in all skyline units and areas yarded with ground-based equipment.

! In units (or portions) requiring ground-based equipment, falling and yarding will be limited to June 1st through October 15th, depending on seasonal rainfall when the following are met: 1) when the soil moisture can reasonably be expected to be at or below 25% of field capacity, and 2) when road conditions are dry for hauling. Falling and yarding equipment would be done with rubber tired or tracked vehicles.

! Ground-based equipment will consist of a feller/buncher and forwarder. The falling and yarding will be done with cut-to-length harvest system cable of directionally felling trees, cutting trees to length, completely limbing the trees, and depositing the slash in windrows between reserved trees. The yarding vehicle would forward the logs completely free and clear of the ground while traveling along the windrow of limbs and/or logging slash created by the harvesting process.

! Designated travel trails in the ground-based units will utilize existing skid roads to the extent possible.

! All trees designated for removal will be cut into lengths prior to yarding, so as not to damage the residual stand.

! To minimize damage to residual trees, do not allow falling or yarding between March 1 and June 30 on skyline and helicopter yarded units.

! All trees designated for removal will be limbed and topped within the units prior to yarding.

! Directionally fall trees away from all unit boundaries. Where density management thinning occurs within Riparian Reserves, directionally fall trees away from all stream channels. Maintain full suspension above stream channels and banks during yarding.

! No-treatment buffers would be applied to streams within or adjacent to thinning units as needed to maintain bank/slope stability and shade. The widths of the no-treatment buffers are identified in Section H of the Analysis File.

- Tree marking guidelines are outlined in Section G of the Analysis File.

- Leave all existing snags except where doing so would create a safety hazard.

- Leave one down trees per acre in all units and create one snags per acre in the north facing units. This would be accomplished after completion of harvest activities.

- In EA Unit 5, cut and remove all trees within a 25 to 40' radius around selected dominant trees to promote growth to the dominant trees (1 tree per 2 acres).

- Density management thinnings will be implemented via an economical commercial operation. Any surplus trees to habitat needs will be removed.

- All or portions of EA Units 14, 15, 16, 26, 27, 28, and 29 are within 0.25 miles of known marbled murrelet occupied sites: therefore, harvest activities such as felling, cable yarding, etc would not occur between April 1 and August 5 in those portions. From August 6 through September 15, there would be daily timing restrictions confining activities between two hours after sunrise and two hours before sunset.

- All or portions of EA Units 14, 15, 16, 26, 27, 28, and 29 are within 0.5 miles of known marbled murrelet occupied sites: therefore, helicopter yarding would not occur between April 1 and September 15 in those portions.

- EA Unit 30 is within 0.25 miles of a known Northern Spotted Owl (NSO) site: therefore, harvest activities such as yarding, felling, etc would not occur between March 1 and June 30 in those portions.

- Road activities (landing construction, renovation, improvement, and decommissioning) will not occur 1 March - 30 June within 1/4 mile of known NSO sites (EA Unit 30), except for those associated with the mainline haul route maintenance.

- Road activities (landing construction, renovation, improvement, and decommissioning) will not occur 1 April - 5 August within 1/4 mile of marbled murrelet occupied sites (EA Units 14, 15, 16, 26, 27, 28, and 29), except for those associated with the mainline haul route maintenance. From August 6 through September 15, there would be daily timing restrictions confining activities between two hours after sunrise and two hours before sunset.

- At least 10% of the stands will be left untreated.

- To lower the risk of blowdown in stands after treatment, portions of EA Units 6, 13, 14, 15, 16, and 29 will incorporate the following: 1) Untreated leave areas or, 2) increased leave trees per acre or, 3) favor selecting Douglas-fir verses hemlock for leave.

- Specific treatments for road closures are identified in Appendix 4.

- When replacing stream-crossing culverts on perennial streams, provide physically unobstructed passage for aquatic-dependent species.

! Accomplish stream-crossing culvert replacements during the instream operating period (July 01 - September 15). Accomplish culvert replacements on intermittent streams after cessation of flow or treat as if perennial. When replacing stream-crossing culverts on perennial streams, divert streamflow around work area, contain sediment (using straw bales and/or filter fabric), and [as needed] pump turbid water from excavation site onto vegetated terrace or hillslope as directed by contract administrator.

! All roads designated for winter use must be surfaced with an approved lift of rock. Renovation/maintenance and landing construction activities would occur during summer or fall (prior to winter storm activity). Roads would be closed according to the Transportation Management Objectives (TMO) plan. Roads designated for summer use only would be mulched, grass seeded (in accordance with District Native Plant Restoration Policy), water barred (where appropriate) and blocked prior to winter storm activity. Prior to first rains after completion of timber sale activity, roads designated to be decommissioned would be blocked, have stream crossing culverts removed, and have waterbars or dips installed as needed to restore pre-road hydrologic function.

! If winter haul on gravel roads is planned, then the following additional Best Management Practices should be implemented to prevent sediment delivery at or near stream crossings along the haul route. The sediment prevention measures must be in place, before winter haul begins. They include:

> Apply an additional lift of rock to the area of road that can influence the stream if rill erosion is evident in the road tread near live stream crossings.
>
> Contain any offsite movement of sediment from the road or ditchflow near streams with silt fence or sediment entrapping blankets. Such control measures must allow for the free passage of water without detention or plugging. These control structures and applications should receive frequent maintenance, and may be removed at the completion of haul.
>
> If the ground is already saturated from winter rains and more than 2 inches of precipitation is predicted in the project area over the next 24 hours, then winter haul should be suspended. Operations may resume after the 24 hour suspension, except when another storm (exceeding 2 inches) is forecasted. Currently, precipitation predictions are based on the Quantitative Precipitation Forecast (QPF) maps from **The HydroMeterological Predication Center internet site: http://www.hpc.ncep.noaa.gov/html/fcst2.html.** A similar predictive model internet site may be used if this site should be unavailable in the future.

! Where density management occurs within Riparian Reserves, POC would be thinned to at least a 50' spacing around individual trees/groups to reduce spread of *Phytophthora lateralis* (PL).

! In density management thinning units, POC leave trees or groups should be spaced at least 50 feet apart.

! The basic strategy for POC management in the Camas Creek Analysis Area is: 1) to manage Low Risk Sites for the long term POC population viability, 2) to limit the spread of PL within the High Risk Sites; and 3) to prevent disease movement into areas with Low Risk. Design features and mitigation consist of active treatments employed on the High Risk Sites (ie. roads and streams) and passive management of Low Risk Sites across the landscape. The treatments for the High Risk Sites include:

1) Wash all road construction and logging equipment prior to move in.
2) Require rocking of roads prior to fall rains.
3) Restrict timber haul to the dry season for following EA Units: 4, 10, 27, & 28.
4) In ground-based yarding areas, the yarding equipment must be able to forward the logs completely free and clear of the ground and will travel along the windrows of limbs and/or logging slash created by the harvesting process. Avoid use of equipment in PL infection sites.
5) Cut unmerchantable POC and Pacific yew 25 feet uphill and 30 feet downhill from edge of running surface on all haul roads on BLM-managed lands prior to timber haul (this includes all harvest landings).
6) All merchantable POC 25' uphill and 50' downhill from running surface on all haul roads within Riparian Reserves, or stands greater than 80 years of age, or trees greater than 20" in DBH will be cut or girdled and left in place.
7) All merchantable POC 25' uphill and 50' downhill from running surface on all haul roads outside of Riparian Reserves, or stands less than 80 years of age, or trees less than 20" in DBH will be cut and removed.

! Best Management Practices (BMP's) would be followed for all actions as listed in Section H pages 69 - 74, Volume 2, Coos Bay District Final Proposed Resource Management Plan, 1994.

Monitoring

Monitoring guidelines are established in the 1995 FRMP/ROD, pp. L-3, L-4, L8, & L9, and the 1994 Standards and Guidelines, pp. E-1 to E-10.

Monitor the effectiveness of roadside sanitation of POC and Pacific Yew, road closures, and equipment washing in limiting the spread of PL into Low Risk areas.

> The Low Risk Areas will be surveyed by use of aerial photos or infrared imagery to detect potential spread of PL from High Risk Areas along roads sanitized and harvest units. This survey would be conducted approximately 5 years from now, when imagery becomes available.
>
> A spot sample of the roadsides will be done on the ground where previous infection centers were mapped and areas of green POC were cut. This should occur 3 years and 6 years after completion of the timber sale contract. This will be done to see if PL has spread into Low Risk areas outside of the sanitized roadside area.

All roads closed as a result of the action alternatives would be monitored to determine whether design features were implemented, and were effective one year after implementation.

Ground-based System Monitoring

A systematic evaluation of the areas yarded with ground-based equipment within a year after completion of harvest activities. The evaluation will determine the extent of the trail network within the unit, the amount of old trails used in proportion to new trails created, and effectiveness of limiting equipment to soil moisture content.

Appendix 2

Density Management Thinning Unit Details

Camas Analysis Area LSR EA
Alternative II - Proposed Action

EA Unit No.	Photo # (97)	Legal	Treated Acres	Treatment	Stand Exam Birthdate*	Harvest System	Comments
1	29-43-36	28-9-23	27	DM-LSR	1963	Skyline	
2	29-43-36	28-9-23	58	DM-LSR	1962	Skyline	
4	29-43-35	28-9-23	33	DM-LSR	1961	Skyline	
	29-43-35	28-9-23	50	DM-LSR	1961	Ground-based	
5	25-44-37	28-9-25	61	DM-LSR	1961	Ground-based	
6	25-44-37	28-9-25	18	DM-LSR	1963	Skyline	Portion in NSO circle
	25-44-37	28-9-25	52	DM-LSR	1963	Ground-based	Portion in NSO circle
10	20-41-174	28-9-21	8	DM-LSR	1961**	Ground-based	Portion in NSO circle
13	20-42-55	28-9-27	23	DM-LSR	1963	Skyline	
14	20-42-55	28-9-27	16	DM-LSR	1963	Helicopter	
15	20-42-55	28-9-27	11	DM-LSR	1964	Skyline	
	20-42-55	28-9-27	27	DM-LSR	1964	Helicopter	
16	20-42-55	28-9-27	20	DM-LSR	1961	Skyline	
	20-42-55	28-9-27	23	DM-LSR	1961	Helicopter	
18	21-40-36	28-9-29	22	DM-LSR	1955	Helicopter	Deleted area north of unit due to NSO concerns.
19	21-40-36	28-9-29	50	DM-LSR	1961	Helicopter	Portion in NSO circle
20	20-41-172	28-9-33	56	DM-LSR	1959	Skyline	
	20-41-172	28-9-33	23	DM-LSR	1959	Helicopter	
21	20-41-172	28-9-33	25	DM-LSR	1959	Helicopter	
22	20-41-171	28-9-33	51	DM-LSR	1961	Helicopter	
23	20-41-171	28-9-33	40	DM-LSR	PL 1968	Skyline	
	20-41-171	28-9-33	18	DM-LSR	PL 1968	Helicopter	
25	21-40-33	29-9-5	18	DM-LSR	1965	Skyline	
26	21-39-126	28-9-31	9	DM-LSR	PL 1965**	Skyline	
27	21-39-126	28-9-31	7	DM-LSR	1966	Ground-based	
28	21-39-126	28-9-31	9	DM-LSR	1966	Ground-based	
29	21-39-126	28-9-31	13	DM-LSR	1961	Skyline	
30	21-39-126	28-9-21	16	DM-LSR	1961**	Skyline	In NSO circle
			784				6,8,8,6,7,9,9,7,8,37

* All stands are D2-= in FOI.
** Birthdate from FOI.
All stands have been previously pre-commercially thinned.

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Camas Analysis Area LSR EA
Alternative III - Alternative Action

EA Unit No.	Photo # (97)	Legal	Treated Acres	Treatment	Stand Exam Birthdate*	Harvest System	Comments
1	29-43-36	28-9-23	18	DM-LSR	1963	Skyline	
2	29-43-36	28-9-23	29	DM-LSR	1962	Skyline	
4	29-43-35	28-9-23	18	DM-LSR	1961	Skyline	
	29-43-35	28-9-23	41	DM-LSR	1961	Ground-based	
5	25-44-37	28-9-25	30	DM-LSR	1961	Ground-based	
6	25-44-37	28-9-25	49	DM-LSR	1963	Ground-based	Portion in NSO circle
10	20-41-174	28-9-21	6	DM-LSR	1961**	Ground-based	Portion in NSO circle
13	20-42-55	28-9-27	16	DM-LSR	1963	Skyline	
14	20-42-55	28-9-27	8	DM-LSR	1963	Helicopter	
15	20-42-55	28-9-27	8	DM-LSR	1964	Skyline	
	20-42-55	28-9-27	26	DM-LSR	1964	Helicopter	
16	20-42-55	28-9-27	14	DM-LSR	1961	Skyline	
	20-42-55	28-9-27	14	DM-LSR	1961	Helicopter	
18	21-40-36	28-9-29	9	DM-LSR	1955	Helicopter	Deleted area north of unit due to NSO concerns.
19	21-40-36	28-9-29	34	DM-LSR	1961	Helicopter	Portion in NSO circle
20	20-41-172	28-9-33	38	DM-LSR	1959	Skyline	
	20-41-172	28-9-33	7	DM-LSR	1959	Helicopter	
21	20-41-172	28-9-33	9	DM-LSR	1959	Helicopter	
22	20-41-171	28-9-33	18	DM-LSR	1961	Helicopter	
23	20-41-171	28-9-33	22	DM-LSR	PL 1968	Skyline	
	20-41-171	28-9-33	14	DM-LSR	PL 1968	Helicopter	
25	21-40-33	29-9-5	15	DM-LSR	1965	Skyline	
26	21-39-126	28-9-31	8	DM-LSR	PL 1965**	Skyline	
27	21-39-126	28-9-31	7	DM-LSR	1966	Ground-based	
28	21-39-126	28-9-31	9	DM-LSR	1966	Ground-based	
29	21-39-126	28-9-31	8	DM-LSR	1961	Skyline	
30	21-39-126	28-9-21	16	DM-LSR	1961**	Skyline	In NSO circle
			491				6,8,8,6,7,9,9,7,8,37

* All stands are D2-= in FOI.
** Birthdate from FOI.
All stands have been previously pre-commercially thinned.

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Camas Analysis Area LSR EA
Alternative II & III

EA Unit No.	Photo # (97)	Legal	Renovation (feet)	Improvement (feet)	Comments
1	29-43-36	28-9-23	800	0	Also use roadside landings - Decom.
2	29-43-36	28-9-23	0	0	Roadside landings
4	29-43-35	28-9-23	0	0	Roadside landings
5	25-44-37	28-9-25	0	0	Roadside landings
6	25-44-37	28-9-25	1,700	0	Also use roadside landings - Decom.
10	20-41-174	28-9-21	0	0	Roadside landings
13	20-42-55	28-9-27	0	0	Roadside landings
14	20-42-55	28-9-27	0	0	Helicopter landing at jct of 28-10-12.0 & 28-9-27.0
15	20-42-55	28-9-27	2,500	0	Decom. - Also use roadside landings & helicopter landing for EA Unit 14
16	20-42-55	28-9-27	0	0	Roadside landings of which one will be a helicopter landing
18	21-40-36	28-9-29	0	0	Helicopter landing on road No. 28-9-32.0
19	21-40-36	28-9-29	1,600 *	0	Decom. - Helicopter landing on road No. 28-9-18.0 B
20	20-41-172	28-9-33	0	2,400	Decom. - Also roadside landings of which one will be a helicopter landing
21	20-41-172	28-9-33	0	0	Use helicopter landing on road for EA Unit 20
22	20-41-171	28-9-33	0	0	Use helicopter landing for EA Unit 23
23	20-41-171	28-9-33	800	0	Decom. - Also use roadside landings of which one will be a helicopter landing
25	21-40-33	29-9-5	0	0	Roadside landings
26	21-39-126	28-9-31	700	0	Also use roadside landings - Decom.
27	21-39-126	28-9-31	0	0	Roadside landings
28	21-39-126	28-9-31	0	0	Roadside landings
29	21-39-126	28-9-31	1,300 *	0	Also use roadside landings - Decom.
30	21-39-126	28-9-21	0	0	Roadside landings
			9,400	2,400	

NOTE: There is no new road construction associated with the action alternatives.
* These roads will be resurfaced for winter use.

Roads identified to be renovated or improved are existing roads open for use that have had some vegetation encroahment and need improvements to drainage. The action alternatives will improve the drainage and the roads will be left in a stable pre-hydrologic condition after decommissioning.

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Appendix 3

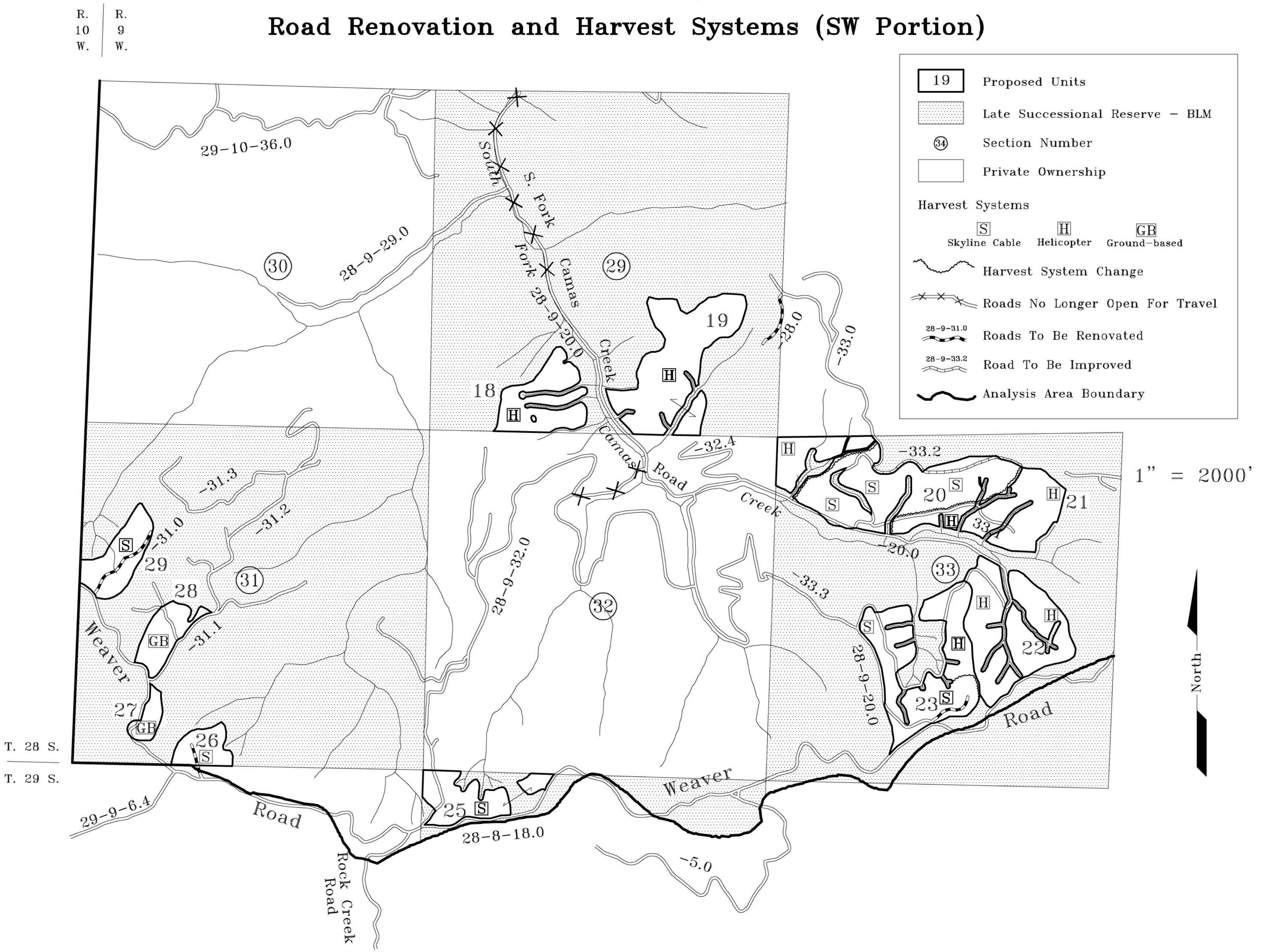
Road Improvement and Renovation Maps

Alternative II - Proposed Action

Road Renovation and Harvest Systems (NE Portion)

Alternative II - Proposed Action

Road Renovation and Harvest Systems (SW Portion)

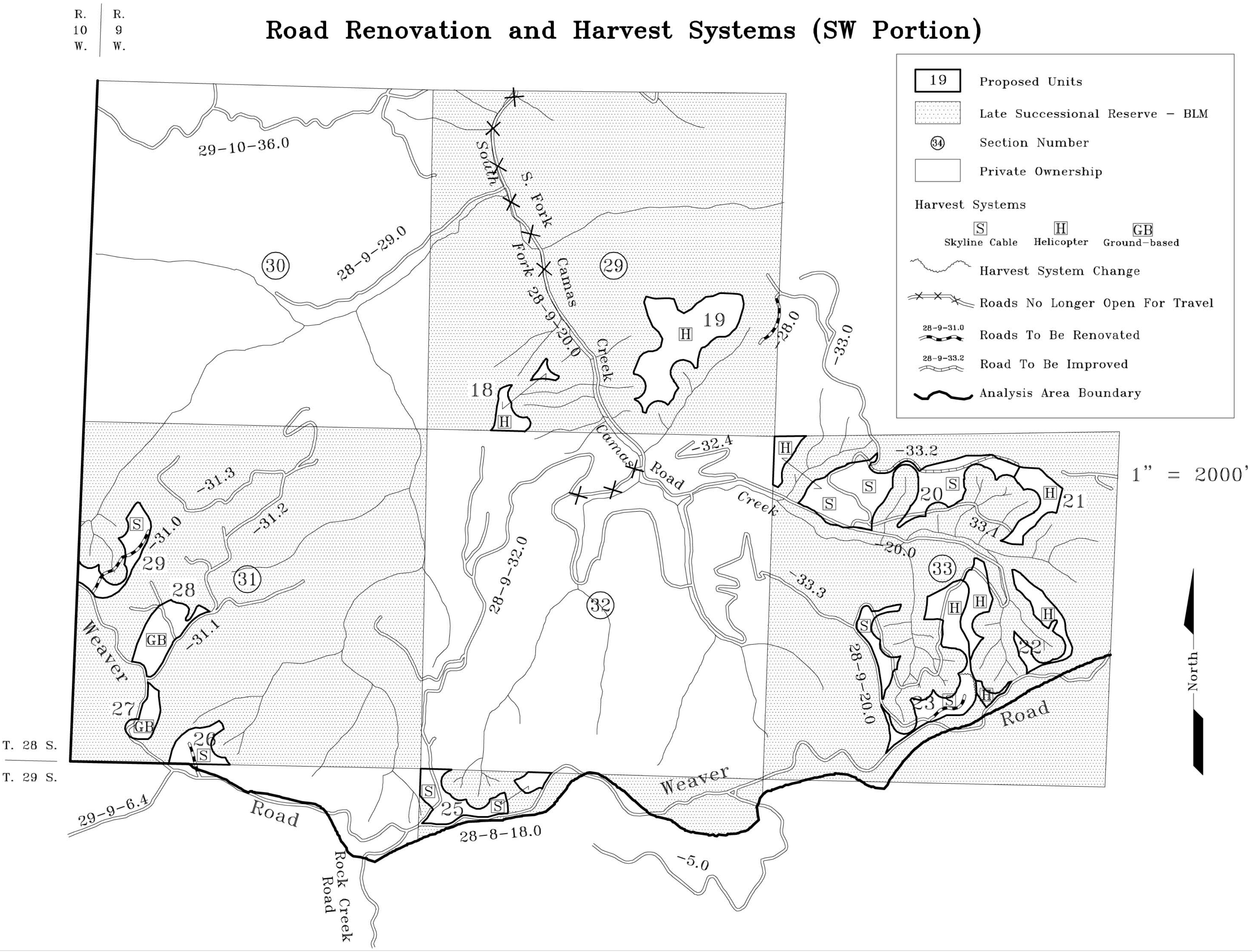


Alternative III - Alternative Action

Road Renovation and Harvest Systems (NE Portion)

Alternative III - Alternative Action

Road Renovation and Harvest Systems (SW Portion)



Appendix 4

Road Closure Recommendations

Camas Analysis Area LSR EA
Road Closure Recommendations
Alternatives II & III

The following propsed actions will be accomplished under timber sale activities covered by this EA.
The recommendation to close these roads incorporated information from the Transportation Management Objectives developed in the East Fork Coquille Watershed Analysis.

Road No.	Miles Decom.	Miles Closed	Remarks	Management Objectives **
28-9-21.1	0.4		Block at jct with 28-10-12.0; remove stream crossing culvert.	1, 2, 3, & 4
28-9-23.1	0.2		Block at jct with 28-9-19.0	1, 2, & 4
28-9-27.0	0.5		Block at jct with 28-10-12.0; remove stream crossing culvert.	1, 2, & 4
28-9-28.0 B	0.3		Block at property line.	4
Spur Road (T28-R9-S29)	0.2		Block by action for 28-9-28.0 B action.	1 & 4
28-9-31.0	0.2		Block at jct with 28-10-31.2; remove stream crossing culvert.	2 & 4
28-9-31.1 A	0.0	0.30	Gate at jct with 28-8-18.0	1, 3, & 4
28-9-31.2	0.0	0.50	Gated by action for 28-9-31.1 A	1, 3, & 4
Spur Roads EA 28	0.3		Block at jct with 28-9-31.1 (28-9-31).	1 & 4
28-9-33.1	0.5		Block at jct with 28-9-33.0	1, 2, & 4
28-9-33.2	0.7		Block at jct with 28-9-33.0	4
Spur Road EA 6	0.3		Block at jct with 28-8-18.0 (28-9-33)	1 & 4
Spur Road EA 23	0.2		Block at jct with 28-9-20.0 (28-9-33).	1, 3, & 4
29-9-6.3	0.1		Block at jct with 28-8-18.0	3 & 4
Total	3.90	0.80		

Decom. = Decommission (Block and left in condition to self maintain. Remove stream crossing culverts ensure hydrological functions.)
Closed = Temporarily Closed (Roads blocked with a gate)

** 1 = Wildlife, 2 = Aquatic Conservation Strategy, 3 = Phytophthora lateralis control, 4 = Road Density

Open Road Density for Camas Creek Subwatershed:

Current Open Road Density: 3.64 mi/sq.mi.
New Open Road Density: 3.30 mi/sq.mi.

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Appendix 5

Density Management Thinning

June 8, 2000

Density Management Treatment

The Camas Analysis Area lies within Late-Successional Reserve (LSR) 261, which has been identified as one of three LSRs that have the highest priority for management actions (LSRA, 1998). This is due to the fact that it is large, forms a key link in the LSR network, and the land ownership pattern provides greater opportunities to either increase or develop large contiguous stands of interior late-successional habitat, as stated in the South Coast-Northern Klamath Late Successional Reserve Assessment (LSRA), page 63. The Camas Analysis Area contains 1,022 acres of stands that are less than 30 years of age, 1,800 acres of stands 30-49 years of age, 65 acres of stands 50-79 years of age, and 2,178 acres of stands greater than 80 years of age. The majority of the stands less than 80 years of age are managed stands that were established following timber harvest.

Table 21 in the LSRA (page 68) shows general priorities to be considered when treating stands in the LSR. High Priority stands are those less than about 30-years of age. Treatments of these stands would manage the density to accelerate the growth of trees by reducing the effects of competition. This is primarily accomplished through precommercial thinnings (PCT). In the Camas Analysis Area, approximately 70% of the acreage in this age class have been pre-commercially thinned. The remainder is either too young for treatment, has low stand density levels not requiring treatment, or is planned for PCT in the near future (62 acres). Therefore, in the analysis area, most all of the stands in this priority have already been, or are planned to be, treated. Medium Priority are stands those between 30 and 50 years of age. These stands are the focus of density management treatments in this EA.

Stand Definition

A timber stand is defined by Husch (1963) as "... an aggregation of trees having some unifying characteristic which occupies a specific area of land." For the purpose of this EA, a stand is defined as a contiguous grouping of trees with similar stand characteristics such as age and density. For the Camas Analysis Area LSR, the Interdisciplinary Team (IDT) considered combinations of tree age, stocking level, and topographic features to determine the extent of manageable/logical stands. Some stands used for analysis may contain all or portions of several Forest Operations Inventory (FOI) units. In all cases the reconfiguration of stand boundaries by the IDT resulted in a logical stand that was appropriate for analysis.

Untreated Areas

The LSRA recommends that at least 10% of the resultant stand would remain untreated when performing density management thinning. No-treatment areas are to provide and retain specified processes and conditions (LSRA, page 82). Areas identified by the IDT to remain unthinned vary in characteristics and therefore contribute differently to the processes and conditions to be retained. Some areas already have a stand composition (species, density, and size) that is desirable. These areas currently exhibit some processes and conditions of late-successional stands and were left unthinned at this time. It may be necessary to consider future treatments in these areas to insure that they remain on this desirable trajectory. The unthinned patches also include untreated areas within the Riparian Reserves. These unthinned areas function to maintain microclimate conditions and contribute short-term coarse woody debris through suppression mortality.

Density Management Prescriptions:

"Density management prescriptions would be designed to produce stand structure and components associated with late-successional conditions, including large trees, snags, down logs, and variable-density, multi-storied, multi-species stands. By removing a portion of the stand, the remaining trees would be provided room to maintain or increase diameter growth rates. Trees cut but surplus to habitat needs would be removed for commercial use" (FRMP/FEIS, page E-7).

"The purpose of commercial thinning is to maintain or improve tree growth rates and vigor, manipulate species composition, and spatial arrangement. This treatment will usually be implemented via an economical commercial harvest operation" (LSRA, page 80).

Stand exams were completed in 1999 on all areas considered for treatment. This information was then modeled using the Stand Projection System (SPS) growth model to develop several treatment scenarios to be considered for each density management unit. The IDT selected the prescription that best balanced benefit and risk by considering blowdown potential, rate of attaining late successional conditions, and maintaining or increasing variability within and between stands.

The average trees per acre currently range from 158 to 385 in the stands proposed for density management treatments. The recommendation (action alternatives) is to thin the stands to Relative Densities of 25 to 40, which equates to cutting an average of 79 to 230 trees per acre. Thinning would primarily be from below, cutting the smaller diameter trees. This level of thinning would leave the remaining trees at a density that facilitates full site occupancy for growth, and promotes development of larger diameters, crown structures, and branches in a relatively short time (Hayes et. al, 1997). The development of larger trees would also enhance future snags and down wood recruitment. These treatments are consistent with the objectives established for the LSR.

Acceleration of Late-Successional Conditions

Silvicultural actions, including density management thinnings, can accelerate the development of desired late-successional stand characteristics (LSRA, page 77). It is possible to estimate the effects thinning will have on some stand characteristics (specifically tree diameter) over a period of time. During discussions at the Coos Bay District BLM (Jan, 2000), Dr. John Tappenier presented research indicating that trees 20 inches dbh at age 50 are more likely to become dominant old-growth trees. His data was derived by analyzing the growth rings of numerous old-growth stumps from harvested late-successional stands. Even though the stands proposed treatment are not naturally regenerated and have not been previously managed for late-successional development, the IDT used this benchmark for comparing various prescription scenarios. SPS modeling data shows that on average, only 29% of the trees in the proposed treatment units would reach a dbh of 20" at age 50 if left untreated. SPS runs also indicate that density management thinning will increase both the number and proportion of trees greater than or equal to 20" dbh at age 50 in these same stands. An application of fertilizer 2 years after treatment will most likely have the effect of further increasing the average tree diameters. A few stands may currently be in such a condition that attaining this goal after treatment is improbable.

Relative density (RD) is defined as “the actual density of trees in a stand relative to the theoretical maximum density (RD100) possible for trees of that size”(Hayes et al). Relative Density is a measure used to project when a stand would reach a density that limits diameter growth and exhibits suppression mortality . At this stage, stands may require manipulation to achieve late-successional conditions. Relative density was used to compare the effects various thinning prescriptions would have on stand characteristics such as trees/acre, basal area/acre, average diameter, and average height. For Douglas-Fir, a RD of 55 tends to result in the onset of suppression mortality. Thinning to a RD of 35 allows the site to be fully occupied, promotes maximum stand growth, and any understory will be shade tolerant species. A RD of 25 is considered a heavy thinning (residual stand is less than fully stocked), which maximizes individual tree diameter growth; subsequent thinning will promote diverse understory development. The IDT developed prescriptions that would balance maintaining the stand density at an optimal level for rapid tree growth, allow for some understory development, and limit the risk of blowdown. Future treatments will most likely be needed to further develop late- successional conditions. These treatments may include additional density management thinnings, and/or stand manipulation treatments such as snag creation, down log creation, and small openings.

Heterogeneity

Silvicultural actions prescribed in the Camas Analysis Area LSR EA are designed not only to accelerate growth rates, but also to maintain or increase diversity and heterogeneity within each stand and across the landscape. Although some stands may be thinned to the same relative density, stand characteristics such as trees/acre(tpa), basal area/acre, average dbh, and average height will vary greatly among stands. In both Alternatives II & III, the existing range of average trees/acre for all stands is 158 to 385. After the recommended treatment, the range of average trees/acre for all stands would be 60 to 155. Stand exam data shows that there is inherent variability in trees/acre and species composition within each stand. While the action alternatives would decrease the average trees/acre in the treatment areas, the variability of trees/acre within the stands would still exist. Also, selection of residual trees with less emphasis on tree spacing allows for the retention of minor conifer species and hardwoods.

Snags and Down Wood

All existing snags would be left standing, except where doing so would create a safety hazard. All existing down wood would be retained on site.

Snag Calculations:

It was determined that at least 2.5 snags per acre would be retained after completion of the density management thinning activities (see Attachment 1). These snags would be from existing snags and/or trees with broken tops.

The goal of the LSRA is to retain at least 3 snags per acre on the north-facing slopes and 1 snag per acre on the south-facing slopes upon completion of any density management treatment. The 2.5 snags per acre exceeds the amount recommended for south-facing slopes. The design feature requiring one tree per acre to be topped on north-facing units after treatment, combined with the 2.5 existing snags per acre, would bring the total to 3.5 snags per acre. This would exceed the amount recommended for north-facing slopes.

Stands would be examined within five years after treatment to assess attaining the desired future conditions for snags. If the stand is deficient in snags, sufficient snags will be created to equal or exceed the desired future condition.

Down Log Calculations:

In developing the down log recommendation, two components were addressed: 1) short-term down logs (decay Class 2), and 2) total down wood that is 4" diameter and larger in all decay classes.

Log volumes for decay Class 2 component found in young natural stands range from 13 to 64 ft^3 per acre (Spies et. al 1991). Design features include leaving one tree per acre on the ground after completion of thinning activities to provide for short-term down wood. One tree per acre provides approximately 46 ft^3. per acre (see Attachment 2). This falls within the range expected to be found in natural stands of this age for Class 2 component (as cited above).

The estimated amount of total down wood 4" and larger (all decay classes) after completion of density management thinning activities is 675 ft^3. per acre (see Attachment 2). This includes existing down wood and one tree per acre left for short-term (Decay Class 2) down wood. This amount of down wood is within the range of total down wood (4" diameter and larger, all decay classes) shown in Table 10 of the LSRA (525 to 1,979 cu.ft./acre). This amount would increase when considering incidental blowdown after treatment, tops from snag creation, and tops of trees left on site after treatment.

The design features for snags and down logs, along with the retention of existing components, meet the objectives set in the LSRA. The remainder of the thinned trees could be removed for commercial use.

Blowdown Risk

Risk of windthrow was looked at from both an individual tree and a treated unit perspective. The ratio between the total height of a tree (feet) and its diameter at breast height (feet) is considered an indicator of an individual tree's overall stability. This height/diameter ratio (h/d) information and the topographic position of the treated units were used to determine areas susceptible to blowdown. Most research associated with blowdown has dealt with stands of relatively large trees being exposed to strong prevailing winds through the action of clearcutting an adjacent area. In this situation, it is the residual timber along the north and east boundaries of clearcut units that are the most vulnerable to windthrow. Also, the lee side of recently exposed ridges are more prone to windthrow. Since, the EA is proposing only density management thinning which does not suddenly expose areas directly to the wind, prediction models do not necessarily apply. However, some concepts to managing blowdown risk can be applied. The IDT felt that the less windfirm lee sides of ridges that are generally perpendicular to the prevailing winds were still more prone to windthrow than the exposed windward sides (which tend to be more windfirm). Management practices on private lands adjacent to the proposed treated units were also considered when evaluating blowdown potential.

Favoring wind-firm species, increasing leave trees per acre, and leaving areas untreated are design features incorporated to manage blowdown risk. Six EA units were identified as having blowdown potential areas. Portions of EA Units 6 and 13 will have areas left untreated. Portions of Ea Units 14, 15, 16, & 29 will favor Douglas-fir as leave trees and/or increase leave trees per acre.

Douglas -fir Bark Beetle Infestation Risk

One scenario under consideration was to leave all the thinned (cut) trees on site, which would leave an average of 156 trees per acre on the ground. Another scenario is to cut and leave approximately 25% of the trees every 5 years over the next 20 years. This would leave on the average 42 trees per acre on the ground every 5 years. Cut tree diameters in both alternatives would range from 7" to 15" dbh, with the majority of cut trees being 10" dbh and larger.

An insect infestation risk assessment (see Attachment 3) for the project area was completed by Dr. Donald Goheen, Entomologist/Plant Pathologist. The purpose of the trip was to consult with BLM managers about possible insect implications of cutting substantial numbers of Douglas-firs and leaving them on the ground. His conclusion was leaving cut trees on site in place would create perfect conditions for Douglas-fir beetle population to increase by providing large numbers of down trees of the proper size classes for brood population. There are Douglas-fir beetles in the area that potentially would infest the down trees and produce brood. Small endemic populations of these beetles survive in greatly weakened tress, especially in root disease centers such as laminated root rot which is found throughout the area. Beetles emerging from the down trees could be expected to kill substantial numbers of leave trees, and could kill trees in adjacent old-growth stands and on neighboring private properties as well. Mortality patterns would be unpredictable. By killing the largest Douglas-firs and Douglas-firs in groups, desired stand structure and required crown closure would be negatively impacted (Goheen, 2000).

Thinning dense stands can make them less susceptible to infestation. However, if large amounts of down wood greater than 8 inches in diameter (20 cm) is left on site following thinning, beetles will have abundant breeding sites and population may increase to damaging levels (Ross, 1997). Douglas-fir beetle infestation of green trees occurs when brood has emerged from a fairly substantial number of down trees. Based on past experience, the threshold appears to be at least 4 down Douglas-firs $\geq$ 10 inches diameter per acre (Goheen, 2000). The more down hosts there are and the larger the size of the down trees, the greater the likelihood that emerging beetles will infest green trees and the larger the number of trees that will likely be infested. A treatment leaving 25 - 230 trees/acre on the ground would result in epidemic population growth of Douglas-fir bark beetles that would attack and kill standing green Douglas-fir trees. The Douglas-fir bark beetles often show a preference for the largest Douglas-firs in a stand and also often cause concentrated mortality, killing all of the trees in patches that vary in size from ¼ to 2 acres. Most commonly, beetle-caused mortality of standing Douglas-firs will be concentrated fairly near the downed trees initially attacked by the beetles. However, Douglas-fir beetles are strong fliers, and in a certain percentage of cases (10 to 20 percent), they infest trees one to 5 miles away from where they emerge (Goheen, 2000).

<u>Fire Risk</u>

One scenario considered was to leave all thinned (cut) trees on site. There would be on average 156 trees per acre cut, which equates to approximately 118 tons/acre of residual material left on site (Worksheet # 3, Section Q of the Analysis File). This scenario would rate out as a High Fuel Hazard using the current Fuels Hazard Worksheet and would persist at this level for at least 10 years (Worksheet # 1, Section Q of the Analysis File). If ignition occurred in this fuel loading, it would likely create a stand replacement fire. A cured fuel load of 118 tons/acre would be completely impassable to firefighters, hampering suppression efforts without the use of large mechanized equipment.

Another scenario would be to cut and leave approximately 25% of the trees every 5 years over the next 20 years. First, thinning at this level would not sufficiently open the stand to promote growth within the next twenty years. Therefore, the treatments would be ineffective and objectives not met. If this was prescribed, it would still leave a total of 105 tons/acre of fuel loading on site after all entries (Worksheet # 3, Section Q of the Analysis File). This would still rate out as a High Fuel Hazard using the current Fuels Hazard Worksheet (Worksheet # 2, Section Q of the Analysis File). The risks would still be the same for this scenario relating to fuel hazards/wildfire risk.

Therefore, based on the issues for fire and insect risk, it was determined that removal of the thinned trees (except those left for down logs) would best promote the desired forest structure while minimizing risk to the stands in the LSR. Due to the issues raised concerning fire and insect risks, leaving thinned material on site would not be a viable alternative. However, the fire and insect risk assessments does support the action alternatives addressed in this EA.

Literature Cited

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Hayes, J. P., S. Chan, W. H. Emmingham, J. C. Tappeiner, L. Kellogg, and J.D. Bailey. 1997. Wildlife response to thinning young forests in the Pacific Northwest. Journal of Forestry 95(8):28-33.

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Spies, T.A. and J.F. Franklin. 1991. The structure of natural young, mature, and old-growth Douglas-fir forests of Oregon and Washington. In: Wildlife and Vegetation of Unmanaged Douglas-fir Forests. Aubry, K.A. and M.H. Brookes, Eds. PNW -GTR-285. pgs. 91-109

Attachment 1 - Snag Calculations

Data from 1998 snag surveys in EF Coquille Watershed for mid-seral stands (30-80 yrs old):

	Snags/acre
Average:	2.25
Upper Limit:	3.02
Lower Limit:	1.47

To be on the conservative side, it was agreed to use the lower limit value of **1.5 existing snags per acre** for snag calculations rather than the average.

Data from post-treatment commercial thinning surveys (table below):

Average number of trees with broken tops: 4.6 trees per acre

Based on the data above, it was agreed that there would be at least **one snag per acre** as a result of a tree losing it's top during the treatment.

It was determined that at least **2.5 snags per acre** would exist after completion of treatment. This was based on combining 1.5 existing snags per acre with the one broken top (snag) per acre.

The goal of the LSRA is to retain at least 3 snags per acre on the north-facing slopes and 1 snag per acre on the south-facing slopes on completion of any density management treatment. The 2.5 snags per acre, calculated above, exceeds the amount recommended for south-facing slopes. It was agreed to include a design feature that would top an additional tree per acre on north-facing units. Combining the 2.5 existing snags per acre with the additional topped tree per acre on north-facing units would bring the total to 3.5 snags per acre. This would exceed the amount recommended for north-facing slopes.

Post Harvest Damage Assessment for Commercial Thinning Units

Timber Sale	**# Broken/Dead Top Trees Per Acre**
Harry's Road Thinning	2
Rock Creek Thinning # 1	15.5
Rock Creek Thinning # 4	9
Chopper Rock Thinning # 1C	0
Rock Again	0
Soup Creek Thinning	4
Fireroad Thinning	1.7

Average:	**4.6**

Attachment 2 - Down Log Calculations

In developing the down log recommendation, two components were addressed: 1) short- term down logs (decay Class 2), and 2) total down wood that is 4" diameter and larger in all decay classes.

Decay Class 2 - Short-term Down Log Volume

Log volumes for decay Class 2 component found in young natural stands range from 13 to 64 cu.ft per acre (Spies et. al 1991). One tree per acre left on site as down wood equals approximately **46 cu.ft. per acre** (calculated below).

> Data from SPS shows that the average diameter for DF leave trees is 15 inches with the average total height of 100 feet.
>
> Using a 15" diameter tree with a total height of 100 feet = 45.9 cu. ft. per tree *
>
> * Table C-2, Conversion Factors for the Pacific Northwest Forest Industry

The design features includes leaving one tree per acre after completion of thinning activities to provide for short-term down wood. This amount falls within the range expected to be found in natural stands of this age for Class 2 component.

Total Down Wood Volume (4" diameter and larger) - All Decay Classes

Based on down log surveys conducted in the EF Coquille Watershed, there is 270 cu.ft. per acre of all decay classes 16" in diameter and larger. Since data was not collected on 4" to 16" diameter down logs, USDA Forest Service General Technical Report PNW-105 (pg 36) data was used to estimate this component. Table 1-DF-2 describes a stand with 269 trees per acre and an average dbh of 11 inches. This closely resembles the action alternative(s) units which have average of 270 trees per acre with an average dbh of 12 inches.

The data from Table 1-DF-2 shows the following:

> 4" to 16" diameter down material = 881 cu.ft./acre
> 16" diameter and larger material = 663 cu.ft./acre

Using the above information, the following calculation was used to estimate log volume of 4" to 16" diameter material on the ground.

$$\frac{\text{4" to 16" (Table) 881 cu.ft./acre}}{\text{16" + (Table) 663 cu.ft./acre}} = \frac{\text{4" to 16" (on-site) X}}{\text{16" + (on-site) 270 cu.ft./acre}} = \text{359 cu.ft./acre}$$

Estimated total down wood 4" diameter and larger (all decay classes):

Existing 4" to 16" diameter down wood per acre:	359 cu. ft.
Existing 16" + down wood per acre:	270 cu. ft.
Tree left for short-term (Decay Class 2) down wood per acre:	46 cu. ft.
Totals:	**675 cu. ft.**

This amount of total down wood is within the range of total down wood (4" diameter and larger, all decay classes) shown in Table 10 of the LSRA (525 to 1,979 cu.ft./acre). This amount would increase when considering incidental blowdown after treatment, tops from snag creation, and tops trees left on site after treatment.

United States Department of Agriculture
Forest Service
Southwest Oregon Forest Insect and Disease Service Center
2606 Old Stage Rd.
Central Point, OR 97502

Attachment 3

Reply to: 3400

Date: March 4,2000

Subject: Insect Assessment, Camas Creek LSR Density Management Project

Attention: Jim Kowalick

On Feb. 22, 2000, 1 visited the Coos Bay District, Bureau of Land Management to examine stands in the proposed Camas Creek Late Successional Reserve Density Management Project area. The purpose of the trip was to consult with BLM managers about possible insect implications of cutting substantial numbers of Douglas-firs and leaving them on the ground.

The objective of the proposed treatment is to accelerate development of large tree/old-growth characteristics in the LSR by thinning young stands. The thinning would be done in some 22 stands over a total area of about 1,300 acres. The project would involve thinning from below in mainly 40-to 50-year-old, predominantly Douglas-fir stands. Proposed treatment areas are interspersed with old-growth stands and privately owned timber lands. A high proportion of the trees to be cut would be 10 to 15 inches in diameter, and 60 to 200 trees per acre would be cut.

If large numbers of Douglas-firs were cut and left on the site, there is a high likelihood that mortality resulting from Douglas-fir beetle (Dendroctonus pseudotsugae) infestation would interfere with managers abilities to meet treatment objectives. Some points to consider about the epidemiology of Douglas-fir beetle include:

I) Under normal circumstances, Douglas-fir beetles do not infest and kill green healthy Douglas-firs. Rather, small endemic populations of these beetles survive in greatly weakened trees, especially trees in root disease centers. Douglas-fir beetles are present in low numbers in weakened trees in several black stain root disease pockets in the Camas Creek area.

2) On occasion, Douglas-fir beetle populations may increase to epidemic proportions. Outbreaks are triggered by events that produce large numbers of weakened hosts all at one time. Fires may occasionally set off population increases, but major wind or snow events that cause many trees to topple or break much more commonly do so. Cutting trees and leaving the logs on site creates the same kind of condition as a blow-down event from the prospective of Douglas-fir beetles.

3) Douglas-fir beetles will infest down Douglas-firs of 10 inch diameter or greater and will produce brood. Down trees occurring under a still-standing canopy provide optimal breeding habitat since beetles prefer and are most successful on down material that is shaded, cool, and moist.

4) Douglas-fir beetles occurring in the vicinity will attack down Douglas-firs in the spring of the year after the trees come down (usually from April to June). They are able to detect stressed or downed trees over considerable distances. Douglas-fir beetles have a one-year life cycle, and the new brood will emerge from the down trees in the spring of the subsequent year. If there are enough of them, Douglas-fir beetles emerging from down logs can infest standing trees.

5) Douglas-fir beetle infestation of green trees occurs when brood has emerged from a fairly substantial number of down trees. Based on past experience, the threshold appears to be at least 4 down Douglas-firs$\geq$ 10 inches diameter per acre. The more down hosts there are and the larger the size of the down trees, the greater the likelihood that emerging beetles will infest green trees and the larger the number of trees that will likely be infested.

6) Number of green Douglas-firs that are infested by beetles emerging from down trees is usually a function of the number of down trees that the beetles breed in. Generally, in the year that the beetles emerge from down Douglas-firs, one standing green tree is infested for every 3 down trees. The next year, one additional host is infested for every 4 to 5 Douglas-firs that were attacked in the first year, and in the third year, one additional green tree will be infested for every 25 that were infested the year previously. Outbreaks usually subside in the fourth year. During the entire course of an outbreak, 4 standing green trees can be expected to be infested for every 10 down infested Douglas-firs.

7) Most commonly, beetle-caused mortality of standing Douglas-firs will be concentrated fairly near the downed trees initially attacked by the beetles. However, Douglas-fir beetles are strong fliers, and in a certain percentage of eases (10 to 20 percent), they infest trees one to 5 miles away from where they emerge.

8) During outbreaks when Douglas-fir beetles infest standing green trees, they often show a preference for the largest Douglas-firs in a stand and also often cause concentrated mortality, killing all of the trees in patches that vary in size from ¼ to 2 acres.

Considering the above-mentioned points, it is my professional opinion that thinning the stands in the Camas Creek LSR and leaving the down trees on the ground would greatly jeopardize BLM's ability to attain the desired objective of accelerating development of old-growth character in the stands. It might also have very undesirable impacts in stands near the treatment areas. The treatment would create perfect conditions for Douglas-fir beetle population increases by providing large numbers of down trees of the proper size classes for brood production. There are Douglas-fir beetles in the area that potentially would infest the down trees and produce brood. Beetles emerging from the down trees could be expected to kill substantial numbers of leave trees, and, as well could kill trees in adjacent old-growth stands and on neighboring private properties. Mortality patterns would be unpredictable. By killing the largest Douglas-firs and Douglas-firs in groups, desired stand structure and required crown closure would be negatively impacted. The treatment would be very ill advised.

If it is absolutely necessary to leave large numbers of cut Douglas-firs on the ground in a thinning treatment in the Camas Creek area while retaining live Douglas-firs on the site, one possible approach might involve use of the Douglas-fir beetle2 antiaggregation phermone methylcyclohex (MCH). This material is registered for use by the EPA and is being tested for protecting standing and down Douglas-fir from attacks by Douglas-fir beetle at a number of locations across the West. It has not yet been tested in Southwest Oregon. Treatments involve attaching bubble caps containing the material to two trees per acre in a systematic fashion across an area where trees are to be protected. Reservations about using an MCI-I treatment in the Camas Creek area include high cost, lack of prior testing of the product in this part of Oregon, and concerns about potential effects to surrounding stands. If MCI-I was to be used, it should first be tested on a much smaller area than the proposed project area.

/s/ Donald J. Goheen
Entomologist/Plant Pathologist
Southwest Oregon Forest Insect and Disease Service Center